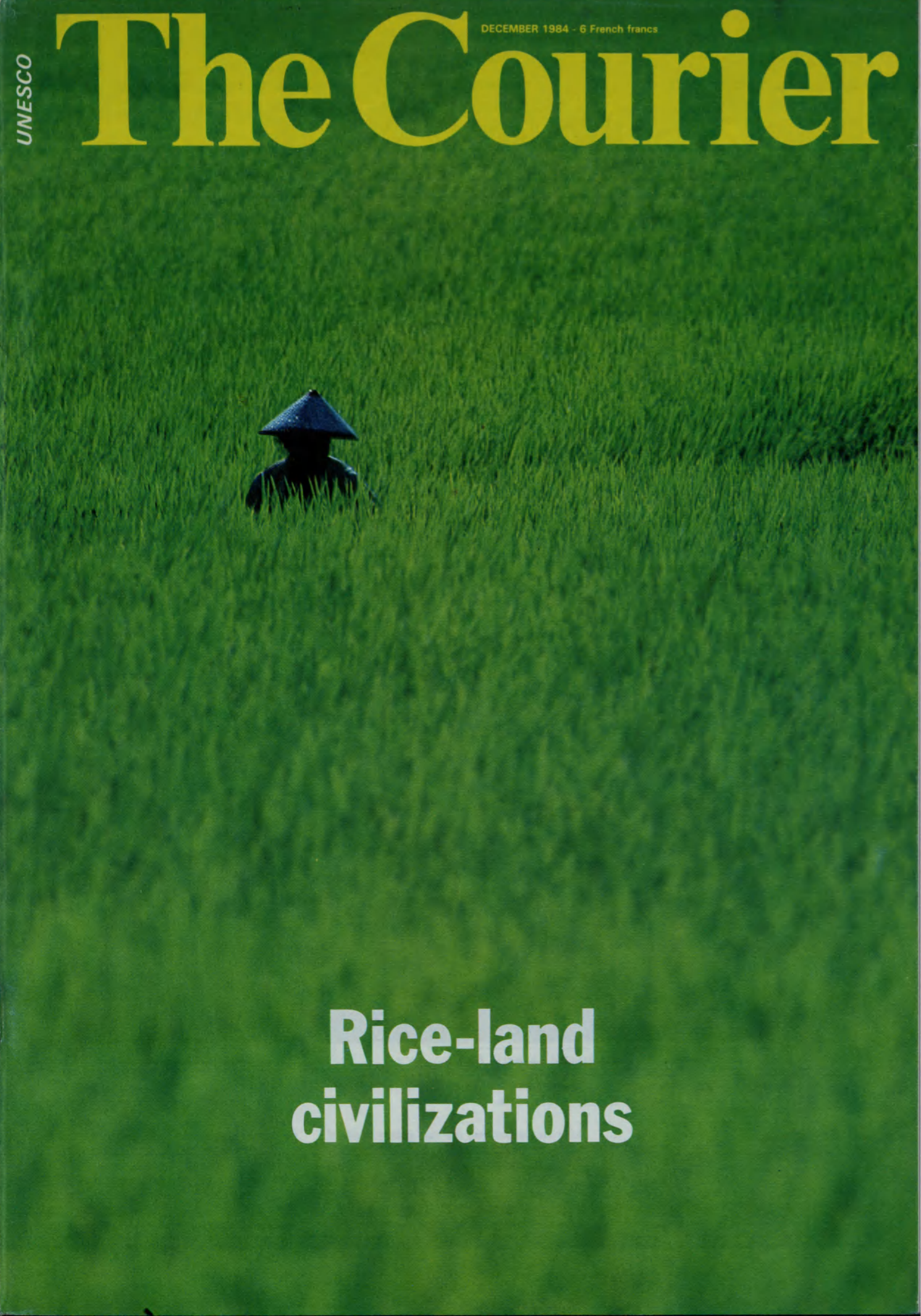
UNESCO

The Courier

DECEMBER 1984 - 6 French francs



Rice-land civilizations

Photo Georg Gerster © Rapho, Paris

A time to live...

30 Argentina

Pride of the Pampa

Life on the pampa, the vast grassy plain of central Argentina, inspired a rich literature in the nineteenth and early twentieth century, and provided the theme for much of Argentina's musical folklore. The nomadic gauchos (cowboys) became legendary figures, renowned for their horsemanship, their spirit of independence, and their physical endurance. Today, with the adoption of mechanization and modern techniques of animal husbandry, the way of life mythified in gaucho literature has been transformed. Photo shows cattle on the pampa being vaccinated against foot and mouth disease.

UNESCO The Courier
A window open on the world

Editorial

December 1984
37th year

IN Asia, where *Oryza sativa,* the most widely cultivated of the world's rice species, is generally believed to have originated, many languages use the same expression, "eating rice", to convey the idea of "a meal" or "eating" in general.

Rice is the staple food of more than a third of mankind. It constitutes half the diet of one thousand six hundred million people and another four hundred million rely on it for between a quarter and a half of their diet. Nine tenths of all rice grown comes from Asia, and the civilizations of this part of the world have developed profound links with rice. Despite the fact that, as the French geographer Pierre Gourou points out in his recently published book *Riz et Civilisation* (Rice and Civilization), rice was not a factor in the emergence of these civilizations (the Chinese and Indian civilizations existed long before rice acquired its later dominant position) it is certainly true that rice has influenced, indeed fashioned, the rites and social structures of these civilizations by the demands it imposes upon them, including the need for availability of a large labour force and mastery of the growing environment.

As was stressed during the *International Symposium on Civilizations Related to Rice Cultivation in Asian Countries* (organized by *The Centre for East Asian Cultural Studies* in collaboration with Unesco, which was held in Kyoto, Japan, from 6 to 10 June 1983), by its physical and spiritual presence rice came to pervade the vocabulary, the daily life, the literature, the arts and even the beliefs of the peoples of Asia.

Owing to the constraints of time and space it was clearly impossible in a single issue of the *Unesco Courier* to assess the influence of rice on all the countries of Asia. We have therefore selected a few particularly striking examples of the impact of rice on the lives and minds of the peoples of the region. These include the deep-rooted notion of the "rice soul", the Tamil festival of Pongal, the *kalapana* system of ancient Thailand and the Azolla cult in Viet Nam.

If a certain emphasis has been given to the impact of rice on myth and custom, not forgetting its socio-economic implications, our opening article by professor Monkombu Swaminathan, director of the *International Rice Research Institute,* draws attention to the progress achieved in genetic research on rice thanks to which crop yields have increased rapidly over the past two decades. The *Food and Agriculture Organization of the United Nations* has estimated that it will be necessary to increase the production of rice by three per cent annually until the year 2000 merely to keep pace with the demands of a rising world population.

Cover: a rice-field in Bali (Indonesia).
Photo Amos Schliack © ANA, Paris

Photo F. Botts, FAO, Rome

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ARGENTINA: *Pride of the pampa*

Editor-in-chief: Edouard Glissant

Published monthly in **28 languages** by Unesco,
The United Nations Educational,
Scientific and Cultural Organization
7, Place de Fontenoy, 75700 Paris.

English, French, Spanish, Russian, German, Arabic, Japanese, Italian, Hindi, Tamil, Hebrew, Persian, Dutch, Portuguese, Turkish, Urdu, Catalan, Malaysian, Korean, Swahili, Croato-Serb, Macedonian, Serbo-Croat, Slovene, Chinese, Bulgarian, Greek, Sinhala

A selection in Braille is published quarterly in English, French, Spanish and Korean

ISSN 0041-5278
N° 12 - 1984 - OPI - 84 - 1 - 417 A

The miracle of rice

by Monkombu S. Swaminathan

KNOWN to have been cultivated in parts of India and China for seven thousand years, rice today is an integral part of the lives of millions of people throughout the world. Used almost exclusively as human food, rice constitutes half the diet of one thousand six hundred million people; another four hundred million rely on it for between twenty-five and fifty per cent of their diet.

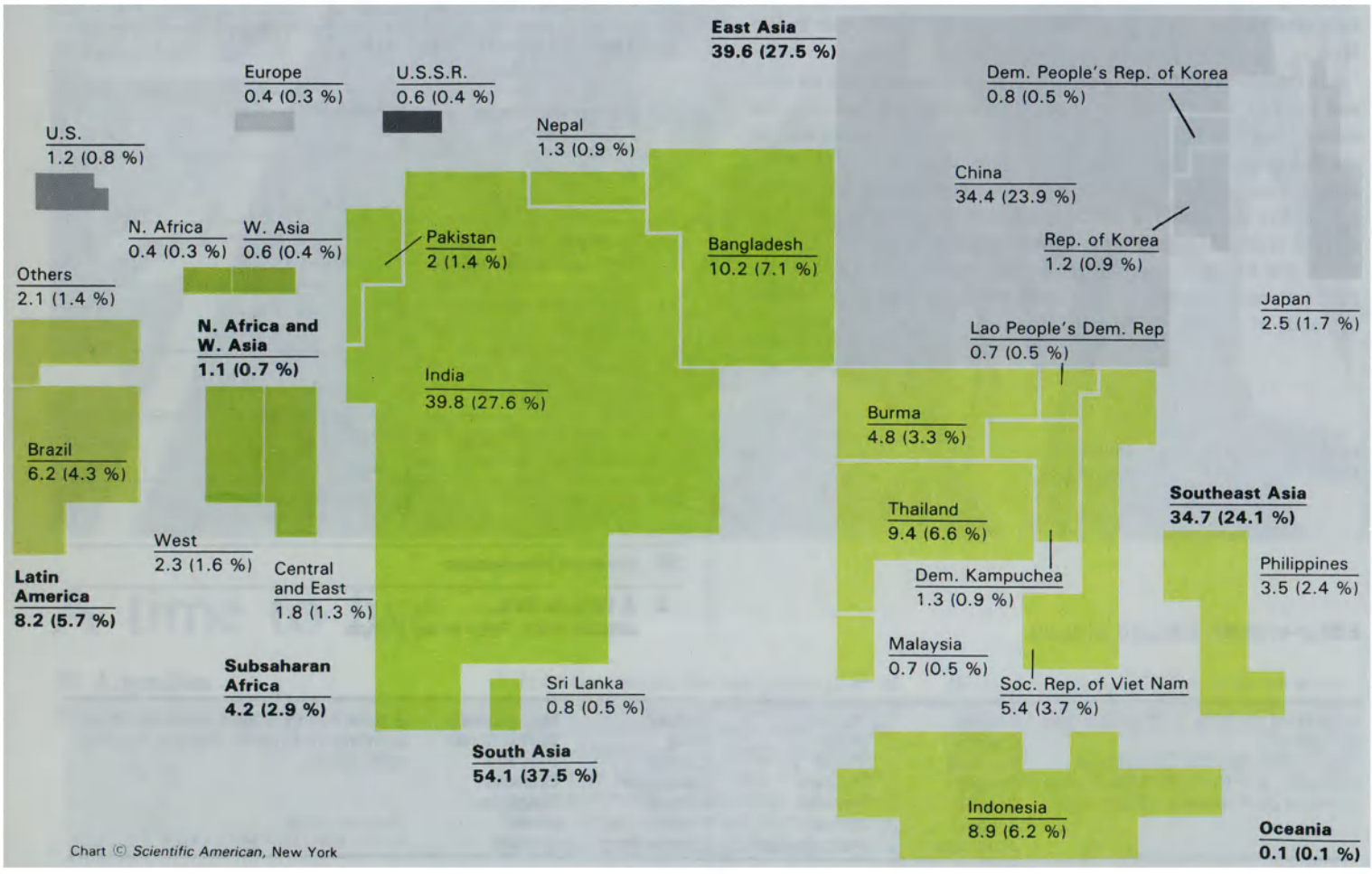
Rice is an annual grass of the *Oryza* genus and grows in a wide range of environments, from 50 degrees north latitude to 40 degrees south latitude and from below sea level to more than 2,500 metres above sea level. Although it was originally cultivated in the humid tropics as a semi-aquatic plant, it is adapted to a wide spectrum of environmental conditions ranging from arid to rather cold situations.

There are two species of cultivated rice: *Oryza sativa,* which is a common rice widely grown in the tropical and temperate zones, and *Oryza glaberrima,* which grows in west Africa. Besides these cultivated species, the genus *Oryza* comprises about twenty wild species.

Over time, three sub-species of *Oryza sativa* developed: *Indica, Japonica* and *Javanica.* The designation *Indica* was used to label the tropical rices and sub-tropical varieties of India and China, while *Japonica* covered the short- and round-grained varieties of Japan, China and the Korean peninsula. *Javanica* was used to designate the *bulu* (awned or bearded) and *gundil* (awnless or beardless) rices of Indonesia. The summer rices, the *aus* varieties of eastern India and Bangladesh and the long-panicled and bold-grained rices of Indonesia, which showed a high affinity with both the *Indica* and *Japonica* rices, were classified as an Intermediate Type.

Extremes of climate also led to the formation of specialized types such as upland and deep-water rices. Varieties capable of tolerating salinity, alkalinity or cool night temperatures also evolved under the combined forces of human and natural selection. There were probably more than one hundred thousand varieties of Asian rice before genetic erosion set in shortly after the Second World War.

The African *Oryza glaberrima* rices have a parallel evolutionary pathway to that of



Schematic map showing land devoted to rice production throughout the world. The space for each country is roughly proportional to the area of land (expressed in millions of hectares) planted with rice. Also shown is each country's percentage of the world total.

Photo © Korean National Commission for Unesco

Rice-field songs in the Korean peninsula. To the accompaniment of a drum, the man standing leads the song and the others respond in chorus. Folk songs accompany every stage in rice cultivation, from planting to harvest, and are often arranged into a kind of "show".

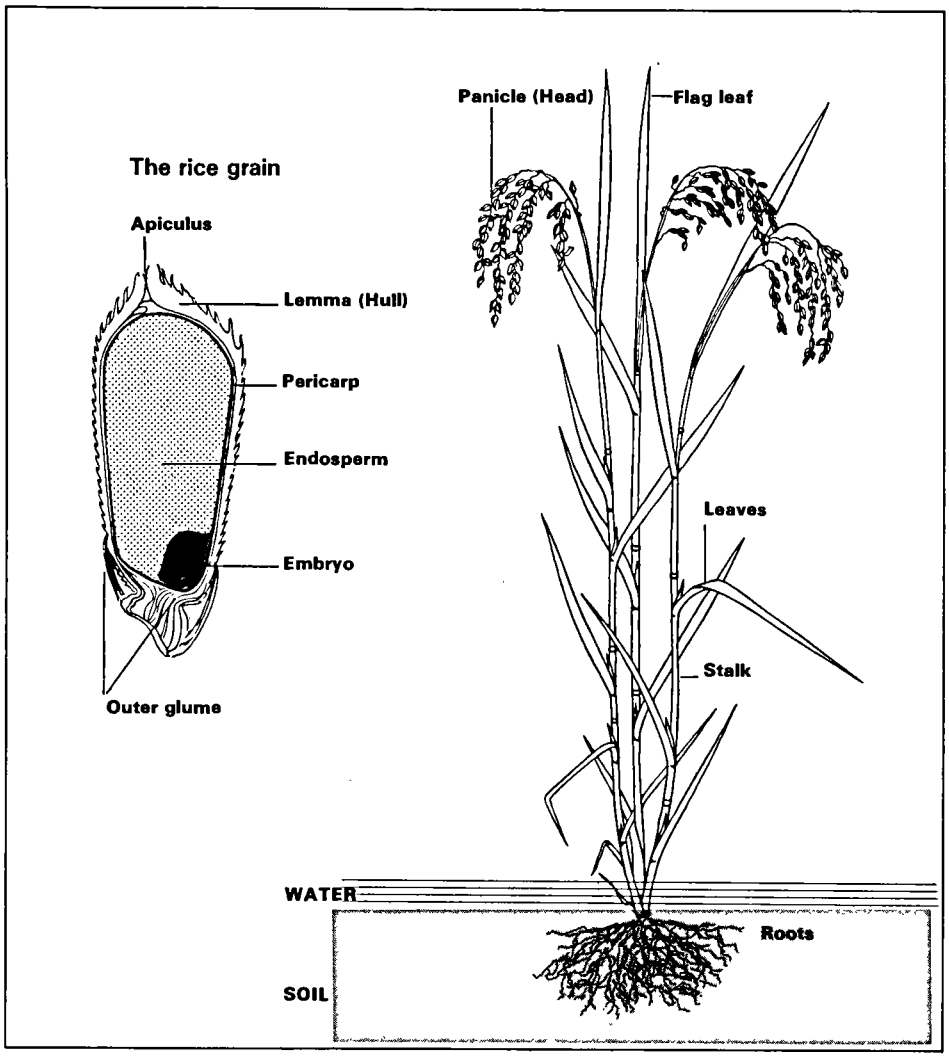
their Asian counterparts, although the history of their cultivation in west Africa is shorter and their diversity less than with the Asian rices.

The many varieties of rice thus developed constituted a valuable pool of germ plasm which it was essential to collect, classify and preserve for current and future breeding programmes.

Shortly after the Second World War, most Asian countries began to conserve their cultivars (varieties developed under cultivation). A number of foreign introductions were also included in each national collection. However, coverage was generally poor of varieties from the remote areas. Few wild species were preserved.

Although rice is not indigenous to the United States, the US Department of Agriculture (USDA) made serious efforts to assemble a world collection of rice. The USDA also funded field collection projects in India and Pakistan. The conservation efforts were materially aided by the construction of a medium-term cold storage facility at Beltsville, Maryland in 1957 and the establishment of the National Seed Storage Laboratory at Ft. Collins, Colorado in 1958-59. The US rice collection continued to grow from about 6,000 in 1960 to about 13,000 in 1981.

During the early 1950s, the International Rice Commission of the Food and Agriculture Organization (FAO) of the United Nations attempted to set up three regional collections for the ecogeographic races: *Indicas* in India, *Javanicas* in Indonesia, and *Japonicas* in Japan. Another set of deep-water rices was maintained in Bangladesh. The four collections totalled 1,344 varieties, but the three centres in the ▶



The rice plant

Oryza sativa, *the world's major cultivated rice species, was domesticated in Asia more than 7,000 years ago and over the centuries differentiated into three subspecies based on geographic conditions. These subspecies are* indica, japonica *(or* sinica*) and* javanica.

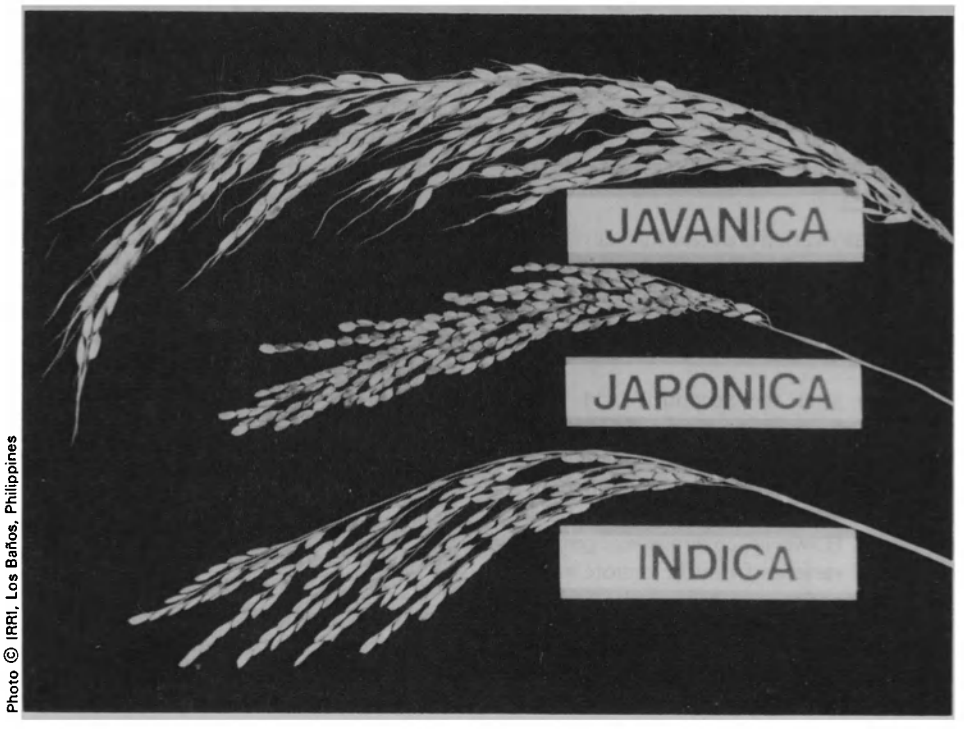


Photo © IRRI, Los Baños, Philippines

tropics could not adequately maintain the seed viability without refrigerated storage. Among the Asian countries, Japan is the only nation to have had medium and long-term storage facility since 1965.

When the International Rice Research Institute (IRRI) began its research operations in 1961-62, it took on the role of a global repository and exchange centre. The IRRI was able to acquire a duplicate set of most national collections. When the high-yielding semi-dwarf rices began to spread quickly in the Asian tropics and to replace the traditional varieties, fourteen Asian countries collaborated with the IRRI in launching systematic field collection operations in both the threatened areas and other remote, hitherto unexplored areas. These collaborative efforts have added 38,000 samples to national collections and the base collection maintained at IRRI. The dwindling wild rices are also a target of conservation. Similar efforts by regional centres and national programmes in west Africa have added 7,700 African samples to the world's rice gene pools.

Since 1978 the International Board for Plant Genetic Resources (IBPGR) has joined the campaigns by providing some of the funds. During 1984 the IRRI collection of cultivars and wild rices totalled 74,000 accessions. Thus, the collective efforts of all concerned have not only saved the rice crop from genetic impoverishment but have greatly enriched the gene pools available for further crop improvement.

Shortly after the IRRI was established, its seed distribution service and the promising sources of desired characters identified by its staff greatly stimulated the national rice research programmes to expand their systematic evaluation projects. Since 1962 the International Rice Germplasm Center at IRRI has supplied nearly 100,000 seed packets to rice researchers around the world in response to more than 3,000 requests. The number of requests indicates the magnitude of research experiments being conducted by rice scientists in different countries.

The IRRI's systematic evaluation operations for a large number of desired traits were expanded and streamlined in 1974 under the Genetic Evaluation and Utilization (GEU) Programme. Multidisciplinary teams were organized to seek rice improvement in eight research areas: agronomic characteristics (especially grain yield), disease resistance, insect resistance, grain and nutritive quality, drought resistance, adverse soil tolerance, deep water and flood tolerance, and extreme temperature tolerance. The magnitude of the IRRI's GEU programme is indicated by the 30,000-50,000 seed samples drawn from the Germplasm Center each year. A major thrust of the GEU programme is to raise yield levels and to stabilize crop production in vast rainfed areas where the numerous subsistence farmers have not benefited from the semi-dwarf rices, which dominate ▶

1

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Photo Unesco-Jaquier

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Photo F. Mattioli, WFP

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Photo Unesco-Jack Ling

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Photo United Nations-FAO

From land to mouth

1. Ploughing a rice-field in Sri Lanka.

2. Mechanized planting on a co-operative farm in the Democratic People's Republic of Korea.

3. Replanting rice in Democratic Kampuchea.

4. Harvesting rice with the sickle in the valley of Paro, in Bhutan.

5. After the rice harvest, villagers of Java (Indonesia) get together to make stacks.

6. Winnowing rice in Burma.

7. In Nepal a wooden beam called a dekhi is used for husking rice.

8. Lunch break in Pakistan.

7

Photo Photo E. Kennedy, FAO

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Photo Jean Tandel © A.A.A., Paris

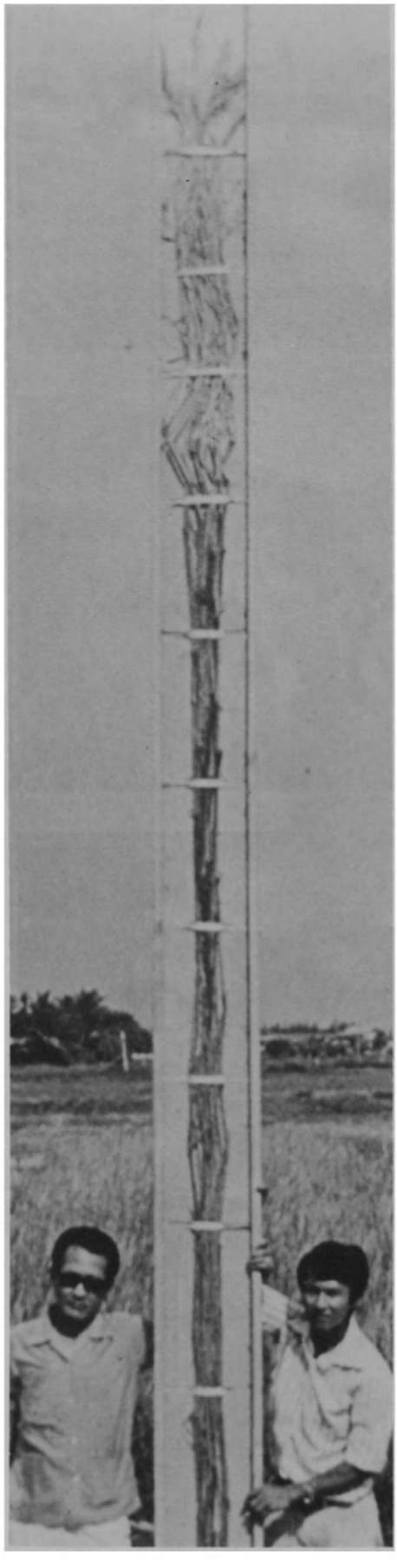


Photo United Nations

The delta region of Bangladesh, consisting of the mouths of the Ganges and the Brahmaputra, is an area where rice farming is difficult because of abrupt rises in the water level, especially since embankments are still not widespread. Farmers in the delta plant deep-water rice which grows as fast as the water rises and may reach a height of 6 metres. Current research is aiming to improve varieties of rice adapted to flooded land.

▶ the irrigated areas. In recent years several Asian countries have organized national GEU programmes.

On an international scale, exchange and evaluation were greatly expanded by the establishment of the collaborative International Rice Testing Programme in 1976.

From 1960 to 1980, average rice yields in Asia rose by forty per cent and production by more than sixty per cent, although it must be remembered that Asia's population rose fifty-five per cent over the same period. These improvements in production are due primarily to increases in yield per hectare rather than to expansion of areas cultivated. This has helped to lower the real price of rice to consumers in several densely populated countries.

How did the farmers of Bangladesh, Burma, China, India, Indonesia, Japan, the Philippines and other Asian countries achieve the feat of raising rice production more in this period of twenty years than in the whole of the preceding 5,000 years? Their success can be largely attributed to five major advances:

1. *The introduction of high yielding, semi-dwarf, modern varieties.*

Traditional, tall varieties of rice have a tendency to "lodge", that is, to fall over because of wind, rain or the weight of the grain. The grain rots or is eaten by rats. Modern semi-dwarf varieties can yield five tons or more per hectare because their strong stems—inherited from their Chinese parents—enable them to stand erect and convert nutrients, water and sunshine into grain more efficiently. About twenty-five per cent of the world's rice acreage is now planted to semi-dwarfs. Many of the new varieties carry built-in genetic resistance to a host of insects and diseases. For example, a gene from a strain of *Oryza nivara,* from north central India, has been instrumental in limiting the ravages of the grassy stunt virus.

2. The development of strains with short growth duration which are insensitive to day-length.

Teams of researchers selectively bred these traits into the modern rice varieties to make it possible for farmers to grow two or three crops where they previously grew only one crop, and to grow superior varieties at different latitudes.

3. Cultivation of hybrid rice.

China is the world's pioneer in hybrid rice production. China now grows more than seven million hectares of hybrid rice. Yields are about twenty per cent higher than those of ordinary semi-dwarfs.

4. Improved irrigation and water management.

Better availability of water gives farmers the opportunity of growing two or more crops per year in the same field.

5. Introduction of new farm-management techniques.

Yields are higher and farm incomes more secure because farmers now have improved implements and mineral fertilizers and better methods of applying them, including integrated procedures for pest control and improved post-harvest technology.

There is a clear need for continued genetic improvement in rice and advantage must be taken of what the new technologies such as tissue culture and genetic engineering have to offer. The FAO has estimated that merely to keep pace with population rise an annual rate of increase of about three per cent in rice production will be needed to the end of this century.

Thanks to the development of early maturing varieties we can now grow two to three crops of rice every year provided there is water and an adequate supply of nutrients. In fact, in IRRI experimental fields there is continuous cropping of rice leading to yields of more than twenty tons per hectare per year.

In this intensive rice production system a hectare of land is divided into thirteen plots because the variety used takes thirteen weeks to mature from the date of planting. By staggered planting one crop is harvested every Monday. After harvesting the plot is ploughed and planted again on the following Friday. Thus there are as many harvests as there are weeks in the year.

This is a good demonstration of the "green power" of the tropics where, thanks to the abundance of sunshine throughout the year, green plants can produce food through the process of photosynthesis. However, such continuous cropping of rice can lead to serious problems of pest epidemics and soil fertility depletion and must be accompanied by integrated pest management and balanced nutrient supply.

An old Chinese saying vividly portrays the green power of tropical rice land. "A field can look gold, black and green on the same day". The gold represents the mature rice crop, which the farmer and his family harvest early in the morning. The same rice field looks black around noon because the family has already ploughed the field in preparation for the next crop. Late that afternoon the field looks green because the family has transplanted a new rice crop.

No wonder that millions of people still regard rice as a unique gift from God to mankind. ■

MONKOMBU S. SWAMINATHAN *is a noted Indian scientist who played a leading role in the "green revolution" in Asia and has worked on a wide range of problems in plant genetics and agricultural research and development in the last 30 years. Since April 1982 he has been Director-General of the International Rice Research Institute, Los Baños, The Philippines. He was formerly Director-General of the Indian Council of Agricultural Research (1972-1979), Vice-Chairman of the Protein-Calorie Advisory Group of the United Nations (1972-1977), and Secretary to the Government of India in the Ministry of Agriculture (1979-1980). He is the author of some 200 scientific papers published in international journals.*

Photos © Ghanshyam C. Patel, Bombay, India

RICE IN MYTH AND LEGEND

by Obayashi Taryo

Above and below, harvest folk dances in the State of Gujarat, northwest India.

ALTHOUGH they have different histories, cultures and societies, all the countries of east and southeast Asia have rice as a common denominator. It is not simply that these peoples cultivate rice; they all have customs, rituals and myths concerning rice which serve as threads to bind them together. Rice culture is extremely important as the common inheritance of these regions.

Myths concerning the origin of rice take many forms. Some have points in common with myths related to other crops. One of these, which is widely current in such parts of the region as Indonesia and Malaysia, tells how crops originated from the corpse of a murdered god or human being. Myths of this kind often relate that other crops originated at the same time as rice. In Java, according to some versions, fruit-bearing plants originated from the corpse of a young girl; dry land rice from the navel; coconut palms from the head and genitals; ripened fruit dangled from both hands, and fruit originated from the legs and ripened in the ground. Among the Manggarai people of Flores Island, it is said that rice and maize originated from the corpse of a murdered child. According to the Japanese classic *Kojiki* ("Record of ancient matters"), compiled in 712 AD, Susanoo slew the food goddess Ohogetsu-hime. Silkworms came from her head, rice seeds from both eyes, millet from both ears, red beans from her nose, wheat from her genitals, and soybeans from her buttocks.

Many mountain peoples of the southeast Asian mainland and islands sacrifice domestic animals such as water buffalo and pigs as an agricultural ritual. Some plain-dwelling peoples of the region, such as the Lao of Laos, also sacrifice water buffalo. The motives underlying this practice are varied. It is believed that the flesh of the animal is presented to the gods in exchange for the gods' gift of an abundant rice harvest. It is also thought that magical power *(mana)* contained in animal blood promotes the growth of plants.

Given the view that death is a premise of life, animal sacrifice has points in common with myths that relate the origin of crops from corpses. In the southeast Asian islands, myth and sacrifice frequently accompany one another. Yet, on the mainland, despite the fact that animal sacrifice is widespread, myths which relate the origin of rice from corpses hardly appear at all.

Another important form of rice cultivation myth refers to the stealing of crop seeds. These myths are found not only in east and southeast Asia but are also widespread among the agricultural peoples of Africa and the Americas. Furthermore, these myths are not exclusively tied to rice ▶

Photo © Katsumi Tamura, Tokyo

In a Burmese village, a sheaf of rice is offered to the guardian spirit of the community. The miniature horses are vehicles in which the spirit is believed to ride.

In a rice-field in Java (Indonesia) a woman binds into a sheaf the first heads of rice to be harvested. Next she will dress the sheaf in cotton print cloth and carry it home in her arms as if it were a baby.

Photo © Teruo Sekimoto, Tokyo

▶cultivation but are also applied to the cultivation of sorghum in Africa and to maize in America. In Samoa, taro origin myths also take this form. In parts of east Asia, amongst the mountain people of Taiwan, for example, this stealing motif is found in myths concerning the origins of millet.

It is said that the ancestors of the Miao people of Sichuan, China, did not have the necessary seed to sow their fields. They set free a green bird which then flew up to the rice granary of the heaven god and returned with the heavenly rice seed and tare. A myth of the Minahassa region of Sulawesi (Indonesia) recounts how a man went up to heaven and returned to earth with unhulled rice concealed in a wound in his leg.

A conspicuous feature of the rice cultivation rituals of east and southeast Asia is the frequent appearance of the concept of a rice soul. The Lamet, slash-and-burn rice cultivators of Laos, constitute a representative example of ancient rice cultivation rituals which are accompanied by this idea. They perform rituals which include strict taboos at each point in the cultivation process, and their concept of the rice soul is similar to those of many of the peoples inhabiting the islands of southeast Asia.

The rice soul is especially important at harvest-time. The cutting proceeds in such a way that the rice soul does not escape but is sent away to the corner of the field. It flies from field to field, finally arriving at a sacred field near the hut. This sacred field is sown before the other fields and harvested after them. In the other fields, the kernel of rice is simply squeezed in one's hand and the unhulled rice is removed. In the sacred field, however, the rice stalk is gently cut and bundled in sheaves which contain the rice soul. From these sheaves the unhulled rice is taken. It is then used to sow the sacred field the following year. If the rice soul escapes, then the rice will not bear fruit.

Rice cultivation taboos and the concept of a rice soul are widely found in the archaic forms of southeast Asian rice cultivation rituals. In Japan these features are found notably in the Amami Islands. They are not at all prevalent in northern Japan, however. One special characteristic of the rice soul concept of many peoples is the extreme sensitivity and susceptibility to injury of the rice soul. It will quickly flee if injured. This idea extends as far west as the Munda people of central India.

In Japan, one example of the rice soul concept is found in the eighth-century *Bungo fudoki* ("Gazetteer of Bungo Province, Kyushu"). It tells the story of an area called Tano, which in olden times was broad and fertile. The farmers of this district developed many rice paddies on this land which bore an abundant crop. The farmers made *mochi* (see article page 20) and used them as targets for their arrows. The injured *mochi* turned into a white bird and flew to the south. During that year the farmers died and their fields went to rack and ruin.

The idea of the fleeing rice soul is also found among the Khmer, a wet rice cultivating people. They tell the following myth: in ancient times, when rice ripened, it flew through the sky and came to rest in a granary. Thus it did not have to be harvested. But on one occasion, a young husband and wife living near the granary made an unpleasant noise which startled the god of rice. They then uttered indiscreet words which offended the god. The god fled into a narrow opening in a mountain. Because of the absence of the god of rice, the people throughout the land starved. They tried various means of bringing the god back, but in vain. Finally, someone was chosen to serve as an envoy to persuade the god to return, and after many difficulties he accomplished his mission.

A variety of animals appear in rice cultivation myths. A legend in which a crane is the bearer of rice is extremely widespread in Japan. Myths concerning some kind of rice-bearing bird are also prevalent on the mainland and islands of southeast Asia, and tales citing dogs as the bearers of rice are found from south China to Assam. One such legend, from the Han Chinese of Sichuan, speaks of the aftermath of a great flood. The survivors of this flood were without crops and in a state of desperation. They noticed a dog crawling out of the flooded fields, and from the rice

CONTINUED PAGE 13

Colour page

Above, a field of rice ripens under a stormy Nepalese sky. Originally cultivated in the humid tropics as a semi-aquatic plant, rice can grow in a diversity of climates ranging from the hot deserts of Pakistan, Iran and Egypt to the high mountains of India and Nepal.

Photo Marc Riboud © Magnum, Paris

Below, Thai workers bagging rice in a riverside godown (warehouse) in Bangkok.

Photo Mike Yamashita © Rapho, Paris

Photo © Hagiwara, Japan

On New Year's Day, the chief of a Lisu village in northwest Thailand scatters rice on the assembled villagers, thereby bestowing on them the spiritual virtues traditionally associated with rice.

Colour page

Above, two Harijan women, with their children, outside their house which they have decorated with rice paste to welcome Lakshmi, the goddess of wealth. The design represents sprays of rice with flowers.

Photo © Prafulla Mohanti, Nanpur, India

Below left, legend has it that the first rice to be brought to Japan was a red variety, and even today a red variety of rice is still cultivated in sacred paddy fields belonging to the Takuzu Shrine, in Tsushima, and the Homan Shrine, in Tanegashima. Photo shows a scene from a famous ritual connected with the red rice of Tsushima. In the village of Tsutsu, in Tsushima, there are 15 old families who take it in turns to cultivate the sacred red rice and to elect one of their number as leader of the ritual. Each year, a tanemomidawara, ***an elaborate rice bale, is woven from the first red rice to be harvested and is hung up in the house of the leader of the ritual. In the middle of the night of the 10th day of the first month of the old calendar, the*** tanemomidawara ***is taken down, covered with a ceremonial robe, and carried in procession from the house of the leader of the ritual for the previous year to the house of the new leader. The villagers line the route and kneel to worship the sacred object as it passes preceded by a torch-bearer.***

Below right, rice cakes made from red and white rice.

Photos © The Asian Cultural Centre for Unesco, Tokyo

CONTINUED FROM PAGE 10

seed that clung to the dog's tail they were able to begin rice cultivation. Their feelings of gratitude to this dog led them to give it a portion of the first meal after the harvest.

In east and southeast Asia the connexion between the rice soul and the gods varies widely. In Java, for example, the female deity of rice *(sri)* is contrasted with the male deity *wisnu* or *sedana*. At harvest time these two gods are thought of as bride and groom. Consequently, when the rice buds appear it is thought that the rice is pregnant. When the rice is harvested, the rice goddess and her husband are transported to the rice granary. They enjoy their honeymoon night without being disturbed. Thus a new fertile crop is prepared for. In contrast to this, in Thailand, the rice deity goes to a shed and is requested to remain there until the following year.

Among the Muong people of Viet Nam, rice is given to the ancestors as well as to the honoured spirits at the time of the New Year festival *(tet)*. Afterwards the rice is not only eaten but is also offered to the rice itself. Thus the rice becomes doubly sacred.

All the gods such as the god of rice, the rice soul, and the god of the fields figure largely in these legends. In Japan the gods connected with rice cultivation are usually gods who do not always remain in the fields. They come to the fields only when the rice is growing. Gods of the mountain become gods of the field in spring, when they come down to the rice paddies. In autumn, after the harvest, they once again become mountain gods and return to the mountains for the winter.

This conception of the seasonal comings and goings of the field gods is important in understanding Japanese rice cultivation beliefs. Although I have not come across a similar concept elsewhere in east and southeast Asia, in Laos there is the idea that the spirit of snakes dwells in the fields and puddles during the rainy season and moves to the rivers in the dry season.

But times are changing. In east and southeast Asia rice cultivation rituals which have been performed in many areas and the widespread legends about the origin of rice cultivation are gradually disappearing with the advance of modernization and changes in farming techniques. The death of an elder means the loss of a legend and the discontinuation of one more annual event. It is the important task of anthropologists and folklorists in these regions to record the abundant content of these rice cultures and transmit them to future generations. ■

OBAYASHI TARYO *is professor of cultural anthropology at the University of Tokyo. A specialist in the cultural history of east and southeast Asia, he is the author of several books on mythology, ethnography, and ancient Japanese cultural history. Professor Obayashi was a participant in the research project for Studies of Rice Cultivation and its Cultural Aspects in Asia, organized between 1978 and 1983 by the Centre for East Asian Cultural Studies, Tokyo, with the assistance of Unesco.*

KRUSHNA
the farmer

by Prafulla Mohanti

KRUSHNA Jena is my childhood friend. We went to school together but he left his studies when he was twelve to help his father with farming. He belongs to the community of farmers in my village of Nanpur in eastern India where the main crop is paddy—rice.

Krushna lives in a mud house with a thatched roof. He is married with five children, three sons and two daughters. His father died five years ago and his seventy-five-year-old mother lives with him.

Krushna is about fifty but looks older. I remember he had a beautiful complexion. But now his skin is dark and withered, the result of working in the sun and the rain.

"Rice farming is a hard task. To work with soil you have to become soil", he says.

Krushna learned to farm by watching his father. He is considered a good farmer, and some villagers ask him to cultivate their land for them. Traditionally the Brahmins and those belonging to high castes are not expected to do manual work. Now the educated feel that working in the fields is degrading. So their land is cultivated by tenant farmers who get fifty per cent of the produce.

Krushna has almost one and a quarter hectares of his own land but the plots are all scattered. Some are three kilometres away from his house. He also works as a tenant farmer for several families. The government has a plan for land consolidation and distribution to enable the farmers to have their land in one area. But the task is difficult as not all the land is irrigated. The plots near the canal are the most valuable.

Krushna starts ploughing his fields from the middle of April, which is the beginning of summer and the new year. The date is fixed by the village astrologer. The ploughing is done by bullocks using a wooden plough made by the village carpenter. There are no tractors; even if they were available it would be difficult to use them because the plots are so small.

"For rice farming a bullock plough is the best", Krushna says.

Ploughing is an art which his father taught him when he was ten. But in the summer it gets so hot that the land cracks and ploughing becomes difficult. Some showers are needed to moisten the land.

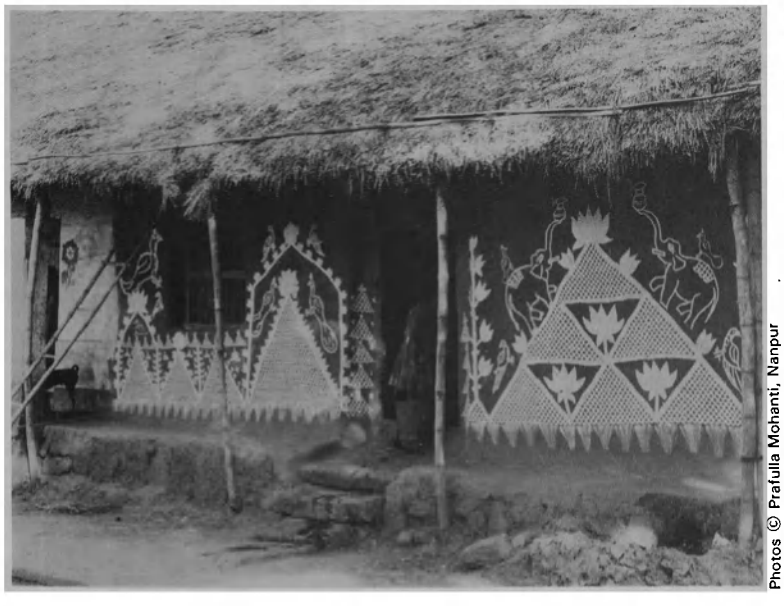
A regular supply of water is essential for rice farming but too much rain can damage the crop. There is a network of rivers but no proper irrigation. During the monsoon, which starts in July and continues till October, the rivers overflow. If the floodwater stays for a week it is good for the paddy, because it leaves a fertile silt which kills the weeds and stimulates the growth. But when the floodwater stays longer the paddy is totally destroyed.

"My old mother is constantly praying to the gods for the right amount of rain to fall at the right time."

By the middle of June the land has been prepared for cultivation. The farmers sow the seeds and pray for the rain to fall. They rest for three days, observing the popular festival of Raja. No work is done and the villagers eat and play. Raja was originally a peasant festival to celebrate the wetting of Mother Earth by the first raindrops of the monsoon. It symbolizes menstruation and fertility. It is a particularly enjoyable time for the unmarried girls. For three days they live together in one room, singing folk songs and playing on swings. They wear new saris and decorate their faces with sandalwood paste and their hair with sweet-scented tropical flowers.

Every day Krushna gets up before dawn, washes his face and feeds his cattle with straw, husks and rice water, which his wife regularly stores in an earthen pot. She sweeps the yards and prepares breakfast for him and the family. Krushna's breakfast consists of a bowl of watered rice with chutnies and raw onions. He has a patch of land at the back of his house where he grows chillies and vegetables. Some days his

Below left, rice paste wall designs in the Indian village of Nanpur feature elephants, peacocks and lotus motifs. (See also colour photo page 12). Below right, Mahlia Buddha, the village deity of Nanpur, with his attendant. The deity is decorated with vermilion paste and a crown of flowers.



Photos © Prafulla Mohanti, Nanpur

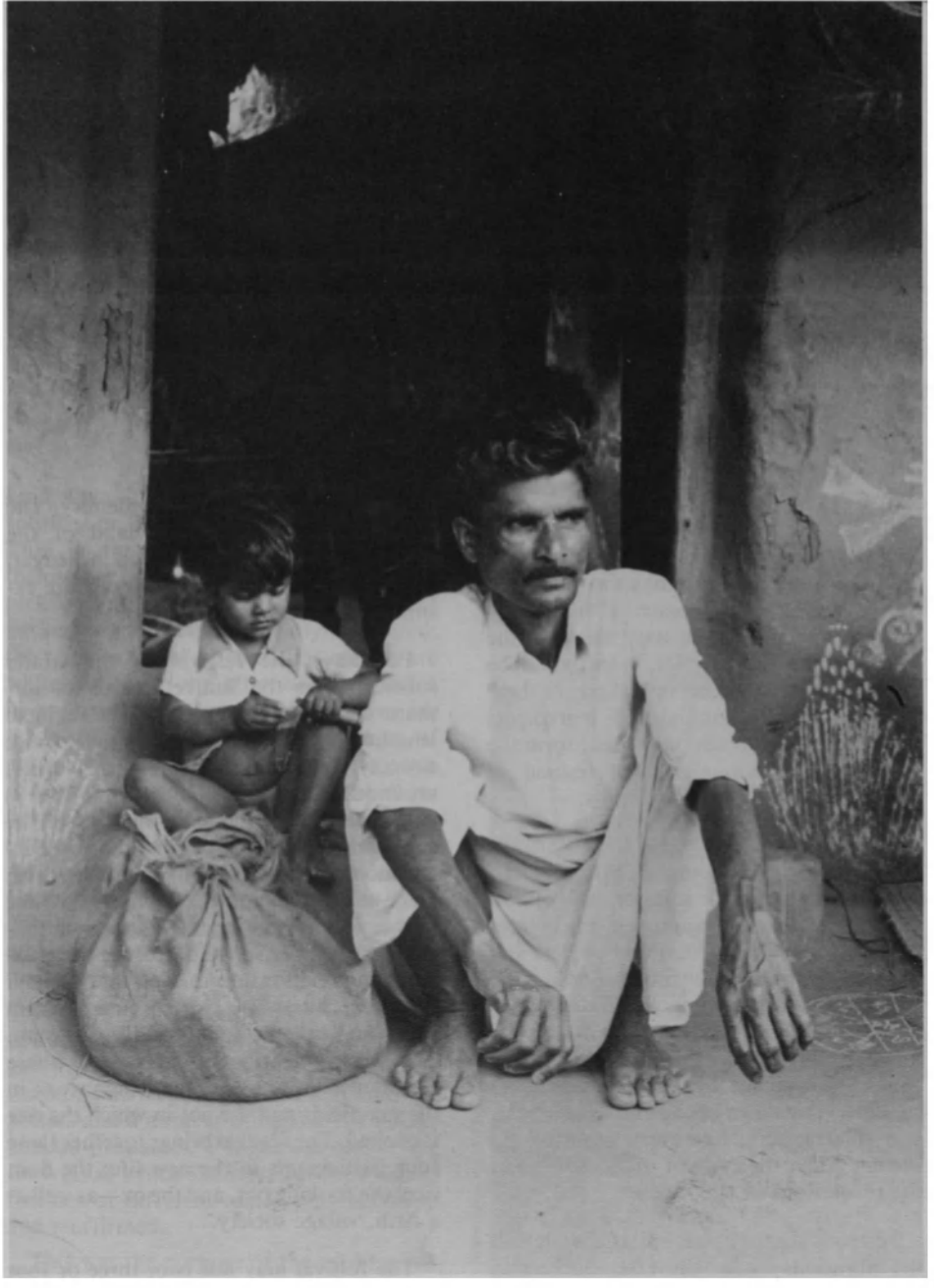


Photo © Prafulla Mohanti, Nanpur

Krushna the farmer sitting with his son at the entrance to his house. Beside his feet is a sack of rice.

mother makes rice cakes for the whole family.

"We eat rice at every meal. In my childhood we did not eat any *chapatis* (unleavened, pancake-shaped bread) made of wheat flour. We only had *puris* (fried wheat cake) for feasts or festivals. But now wheat is cheaper than rice and many villagers have started eating it for their evening meals. At midday we eat boiled rice, *dal* (lentils) and vegetables. After feeding the family my wife puts whatever rice is left over in water and stores it in an earthen pot. It is left to ferment and is very popular during the summer. It is called *pakhala bhata* and is delicious when mixed with yoghurt and lemon juice and eaten with dried fish and fried spinach."

After breakfast Krushna goes to his fields. Sidhia Malik the Harijan helps him. Sidhia has no land of his own and works as a tenant farmer. Until recently even the plot on which his house stands belonged to a high caste villager. Now the government has passed laws relating to land reform which gives the ownership of the land to Sidhia. He worked hard, saved some money and bought two bullocks. But one died suddenly last year. He has not been able to buy another and borrows Krushna's animals to plough the fields. Krushna stops work at noon. On the way back he bathes in the river, washes his animals and gossips with his friends about farming. He says his prayers before eating his food and rests until the sun loses its strength, about three in the afternoon. He returns to the fields to work until it gets dark, around six in the evening when his wife lights the oil lamp to welcome the night.

He fetches water from the well, feeds the animals and tethers them in their shed. While drinking a glass of tea with roasted rice sprinkled on it he tells his wife about the day's work and listens to film music on the radio. Some evenings his friends join him and he discusses his daughter's wedding with them. She is seventeen and has just left school.

"It is not good to keep an unmarried daughter in the house", Krushna's mother warns him again and again.

But it is not easy to find a suitable boy. The parents demand dowries; wristwatches, cycles, radios and gold ornaments. Now that television has come to the towns it has been included in the dowry.

"If only my son could get a job my problems would be over."

His eldest son is twenty-four and recently graduated in arts from the local college. So far he has not been successful in finding a job and sits at home doing nothing.

"It's difficult for me to get ready cash, we eat whatever we grow and very little is left over to sell. I educated my son so that he would be able to work in the town and send me money."

If the rain does not fall at the right time to germinate the paddy the farmers get desperate. They have to buy more seeds, which are expensive. After each harvest a certain amount of paddy is kept aside to be used as seeds but often most of it is either eaten by rats and insects or cooked for food.

Rice seedlings are cultivated specially for transplantation and the process needs a lot of care. First the seeds are sprayed with insecticide and dried in the sun. Then they are soaked in water for twenty-four hours, taken out and kept in bamboo baskets. They are covered with straw and sprinkled with lukewarm water. Gunny bags are spread over them. After three or four days the seeds begin to sprout. By then the farmers have prepared special patches of land with manures and the seeds are sown. The seedlings take three weeks to grow to a height of ten centimetres and are ready to be transplanted. In the meantime the fields are levelled, the soil must be like mud. The seedlings are planted in rows, fifteen centimetres apart. The rice plants need a constant supply of water, approximately four centimetres. Two weeks before harvest the fields are drained dry.

"It takes four months from the day I plant the seeds until the day of the harvest. There are lots of problems. If the wind blows strongly at the time of flowering, the rice is damaged. Insects eat the plants and I have to spray them with insecticides, which are expensive. But we don't use them after the paddy has come out."

The intense green fields ripple in the breeze like green waves. Gradually the colour changes to deep green and when the plants reach a height of a metre or so, they turn golden yellow. If it is a good crop the plants bend down under their own weight.

"It gives me a lot of pleasure to see the fields full of crops. I'm glad that I'm a farmer so that my family can eat pure food grown by me. The food we buy is adulterated. The traders mix sawdust with flour and white oil with cooking oil. In the winter months I grow lentils, potatoes and vegetables and sell some of them in the market. I like market days when I meet my friends from the other villages. I also grow a second crop of rice during the dry season."

Krushna does not know what the green revolution is. The farmers are encouraged by the government to use high-yield rice, fertilizers and pesticides to produce a second crop. But it can only be achieved from November until May. A few acres of irrigated land are cultivated, the rest remains barren. Previously cow dung was the only form of manure, but the village women burned most of it as fuel. Fertilizers and pesticides are sold in the market place without any restriction. Most farmers are ▶

▶not aware of the harmful effects they can have on crops and health. The pesticides are so poisonous that they have killed off much wild life. The jackals have disappeared, the frogs who used to fill the night air with their croaking are gone.

"I spray pesticides, covering my face with a cloth. I hire a pump from the government. It would be easier if I could have my own pump, but it costs a lot of money. The government has introduced new seeds producing more per hectare than the local seeds. The rice is white and cooks well, but there is no taste in it.

"I grow different kinds of rice; some with long grains, some short, and all with different flavours and typical of our area. My mother insists on growing them. Otherwise we will lose them in a few years, she says."

"When I harvest the rice in November the sky is blue and the sun is golden. I cut the paddy and leave it in the fields for a few days to dry. I then tie it into bunches and carry home the bundles on my head. I feel very proud. When the harvest is good the whole village smiles.

"On Thursdays during the harvest season my wife cleans the house, gives the floors and walls a mud plaster and decorates them with rice paste to welcome Lakshmi, the Goddess of Wealth. My daughters make garlands with sprays of paddy and put them around the house. I don't go out to work and stay at home. My wife prepares an image of the Goddess Lakshmi by putting a bowl of rice in the middle of the room and decorating it with coins and flowers. The first rice from the field is offered to the Goddess and shared among the family. That night I can sleep well, but my problems are not over. Whatever I get from the land is just about enough to maintain my family. With eight people to look after I have to buy clothes, medicines and pay for the education of my children. I can't afford to buy a new shirt for myself. Floods and droughts occur regularly and I don't get the return for the labour I put in." ■

PRAFULLA MOHANTI *is an Indian writer and painter. His paintings have been shown in many parts of the world, including Europe, the US, and Japan, as well as India. His classic book* My Village, My Life *(1973), an evocation of the Indian village where he was born and brought up, has been translated into Japanese, Norwegian and Danish. His pen-portrait of the English as seen through Indian eyes will be published next year by the Oxford University Press.*

PONGAL

by Guy Deleury

WHAT could be more usual for a farmer or villager of southern India than to boil his rice? What could be more common than the potbellied vessel in which the women of his family prepare the meals each day? Between the Equator and the Tropics, what could be more familiar than the Sun? And yet these are the three commonplace ingredients which, along with cows and oxen, form the centre of the annual cosmic festival of Pongal in the land of the Tamils.

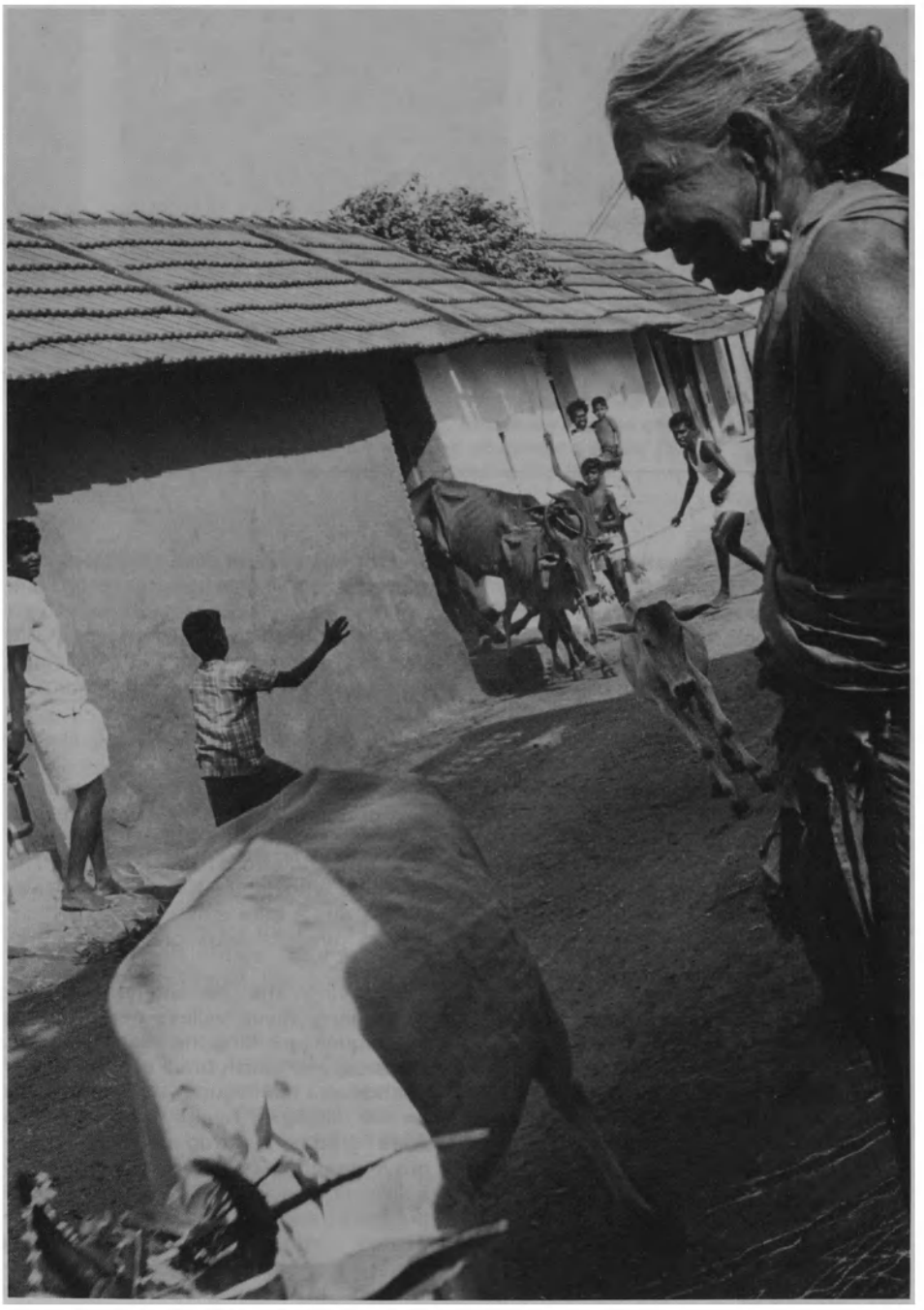
Some civilizations have tried hard to separate the sacred from the profane and to confine religion to the sacristy. The Hindu has a quite different approach. He creates his liturgies from the humblest objects and the activities of the daily round. For him the cosmos is an organism in which the trembling of a blade of grass on earth affects the most distant stars. The castes gravitate around the village like planets around a sun, each in its own orbit. The caste system is a solar system, like every atom of the human body, the cycle of the seasons, and the revolutions of the Moon.

Festivals are the nodal points at which all the vibrations of the Universe concentrate in a sound imbued with meaning. Pongal is the most notable example of such a festival. Every Hindu country has its own variant in which it expresses its specific identity. The festival of Ganpati in the land of the Marathas, the festival of Durga in Bengal, and the festival of Onam in Kerala are examples of these manifestations.

Pongal is the festival of the winter solstice, when the Sun returns to its northern course; soon the days will begin to lengthen again. Even if today the solstice actually falls almost a month earlier, around 21 December, the ritual solstice is still observed on the same date as in the sixth century, perhaps because the Sun's entry into the constellation of Capricorn takes place at the same time as the harvest of the new rice. The date highlights the relationship between the Sun and rice, the ritual extends the relationship to man and society. The Sun causes the rice to emerge from water and become food and life for man. The instruments of this two-phase transmutation are the oxen which work in the rice-fields and the pot in which the rice is cooked. The festival brings together these four participants in the new life: the Sun, rice, the cooking pot, and the ox—as well as a fifth, village society.

The festival may last two, three or four days; its length varies in different parts of Tamil Nadu. The first day is the vigil, known as *bhogi* or "enjoyment", of the

During the Pongal festival celebrated in Tamil Nadu, southern India, oxen and cows become kings and queens for a day. Opposite page below, in the village of Mel Seval, Tirunelveli district, a woman cooks rice for the household cattle. On the ground can be seen the lines of the* kolam, *a propitiatory design traditionally traced in front of the house with white lime powder (see* Unesco Courier, *March 1984). Right, newly washed and garlanded, cows and oxen wander freely through the village all day long.



Photos © Marie-Louise Reiniche, Paris

kind that is celebrated at the summer solstice, or *diwali,* the festival of lamps. This is the day when people cleanse themselves of the year gone by. The boys pick up any scraps of wood or pieces of basketwork that happen to be lying around; the outer walls of houses and temples are whitewashed. In the afternoon rice boiled in water is eaten. Sometimes sacrifices are made to Mariayamma, the goddess of epidemics; more generally there are rituals in honour of ancestor spirits. Old earthenware pots are smashed, and the potter gives new pots to his customers. Just as they do for the festivals of Durga in Bengal and of Ganpati in Maharastra, the potters work day and night for weeks beforehand to make the pottery that will be used during the festival.

Today it is increasingly common for this pottery to be bought at the bazaar. In the past there was a nexus of links, governed by the *jajmani* system, between each family of potters and a number of families of village peasant-producers. Pongal was one of the festivals at which the links between village families of different castes were bolstered and reaffirmed.

This was the purpose of the celebrations on the second day, known as the day of the great pongal or, in some cases, the pongal of the gods. Each family boiled its pot of rice and went, according to traditional rules of precedence, to offer portions of it on banana leaves to other families. Sometimes the high castes cooked their pongal in the morning and the other castes in the afternoon. The communal pongal was also boiled before the temples. On this day the favourite form of pongal is sugar pongal; its preparation is accompanied by a variety of customs involving the use of brown cane sugar, coconut, raisins, fried lentils, cardamom, saffron, and a hint of edible camphor. Each family was proud of its own recipe, and for the children this delicacy is the very heart of the festival, along with the sugar cane and the new clothes.

For the children are given fine stalks of sugar-cane to chew. We know that the Indians invented sugar, since the very word can be traced back to Sanskrit. Pongal is also pre-eminently a day for sugar. In Maharastra, where the festival is called Makara-Sankrant (entry into Capricorn), tiny sesame pellets are given to elders and friends to whom the giver says, "take this sweet and tell me sweet things". By giving and receiving these titbits the villagers vow to put honey into all their relationships in the coming year.

On that day or on the following day, red-ochre stripes representing Shiva are painted on the white walls of the temples of Vishnu. But this third day is primarily the pongal of the herds. Cows and oxen are the kings and queens of this feast-day. They are washed and beautified, their coats are decorated, rice-straw garlands are hung around their necks, their horns are trimmed, and a sacred cord of munj grass fibre dipped in yellow-red turmeric is hung between them. Thus bedecked the animals are left to wander at liberty through the village; sometimes a solemn procession is organized at which the rules of precedence of the village castes are respected. Then the beasts too are fed with perfumed and sugared pongal.

Legend has it that cattle will only agree to leave their paradise to help men work the land on condition that once a year they will be feted and given a holiday. By honouring them, the village recognizes its debt towards the milk cows and draft animals. The castes of men and beasts must help each other out so that the cosmos can turn.

Perhaps it is this cosmic aspect which gives significance to the bull running which takes place on the fourth day of pongal. The animals are specially chosen for their aggressiveness and strength; their horns are sharpened to make them more dangerous; gold or silver medals are attached to their foreheads. They are released one by one on a carefully marked out track winding through the middle of the village. In the midst of tumultuous shouting or anxious silence, young people try to snatch the medals from the bulls. The powerful vitality of the bulls of the Sun is unleashed in the land of the Tamils on the day of the winter solstice, and they are dispatched on their northern trajectory. ■

GUY DELEURY *is a French author who has spent much of his life in India and has written widely about aspects of Indian thought and civilization. Notable among his published works are* Renaître en Inde *(1976) and* Le Modèle Indou *(1978), an essay on the structures of Indian civilization past and present. His latest book,* L'Inde en Fête, *will appear in 1985 as part of an encyclopaedia of myths and religions (Lidis publisher, Paris).*

China's 7,000-year-old crop

by Hu Baoxin and Chang Shujia

PADDY rice cultivation has a long history in China. A passage from *The Book of Songs,* which describes how "dates are gathered in August and rice harvested in October to make wines for the spring to celebrate your enjoyment of longevity", testifies that as early as 3,000 years ago under the Western Zhou Dynasty, Chinese people in Shaanxi province harvested rice and made rice wine. But the cultivation of paddy rice can be traced much further back. Excavations in 1973-1974 in Hemudu village of Yuyao county, Zhejiang province, revealed that *indica* rice grown in the area of Hangzhou Bay has a history of at least 7,000 years.

A high level of intensive paddy rice cultivation was achieved under the Han Dynasty (202 BC to 220 AD). Records of the transplantation of paddy rice can be found in the *Simin Yueling (Farmer's Almanac)* written during this period, and by the 6th century, a number of outstanding, comprehensive, theoretical works on paddy rice cultivation had been written.

According to Li Bozhong, "the technique of rice-wheat multiple cropping was introduced in a few of the most developed districts approximately during the reign of the Emperor Gaozong and Empress Wu (650-704) during the Tang Dynasty (618 to 906 AD). It was generally adopted during the early and middle Tang Dynasty, mainly in the Changjiang Delta, the Chengdu Plain and along both banks of the Changjiang River".

From the middle of the Tang Dynasty period, the Huanghe River Valley suffered from continuous wars and the feudal rulers depended more and more on revenues in kind from the south to defray their huge State expenditures. The point was reached when nine-tenths of the revenues collected from the whole country came from the area south of the Changjiang River. Since, in the area south of the Changjiang, it costs twenty to thirty per cent less to cultivate a paddy field than an equivalent area of dry land crop, the peasants tended to grow more paddy rice so as to increase their income.

Under the feudal system, exploitation of tenants by the landlords was extremely severe. Su Shi, a great writer of the Song Dynasty (960 to 1279 AD) described how "income was divided into two halves between the landlord and the tenants". Rent was mainly collected in kind, but by the end of the feudal period, money rent was also being collected and payment was being made in silver. However, the basis of the rent was still in kind as the sum of silver to be collected would be the price of a fixed amount of grain sold on the market.

Rice is thought of as having always been the principal food of the Asian people. Although this is basically true today, during the long period of feudal rule in China, only the rich and middle-class families could afford to eat rice daily. The peasants who did the tilling were obliged to eke out a bare existence on wheat, barley, miscellaneous grains, potatoes and taros.

Following the reclamation of the Changjiang River valley, new farming techniques including the use of ploughs, harrows and earth-breakers, and new cultivation techniques with emphasis on the raising of healthy rice seedlings were gradually introduced. Great improvements were made in farming implements. Crooked shaft ploughs, earth-breakers and earth-cutters were invented. Irrigation implements using water-power to raise water automatically, such as waterwheels, dragon-bone water lifts and windmill water carriers, came into widespread use.

Many large-scale irrigation projects were undertaken, such as the famous Dujiang Yan Weir in Sichuan Province, the Ling Qu Canal in Guangxi Province, the Zhengguo Qu Canal in Shaanxi province, and the Zhangshui Qu Canal in Linzhang county, Hebei province. In the south, many small-scale irrigation systems were built. To increase the sources of fertilizer, many methods of collecting and making composts were devised, involving the use of dung from cattle-sheds, the rotting of various organic substances, the fermentation of cake manure, and the burning and baking of dung.

Many varieties of improved strains of paddy rice were bred and selected. The method of selecting fine ears for breeding was first used under the Western Han Dynasty (202 BC to 9 AD) and is still employed by peasants today. For example in the 1940s Chen Yongkang, a well-known rice-grower of Songjiang county, Jiangsu province, succeeded in breeding a species of *Japonica* known as Lao Lai Qing which produced record yields.

China also introduced advanced techniques and fine rice strains from foreign countries. For instance, Zhan Cheng rice, which was introduced from Viet Nam, was widespread in Fujian province as early as in the Northern Song Dynasty (960 to 1126 AD), and eventually established its superiority among the broad masses of rice producers in South China. Its outstanding resistance to drought earned it the nickname of the "drought-defeating" rice. Another

Han dynasty wooden rice seeder, dating from the first century BC.

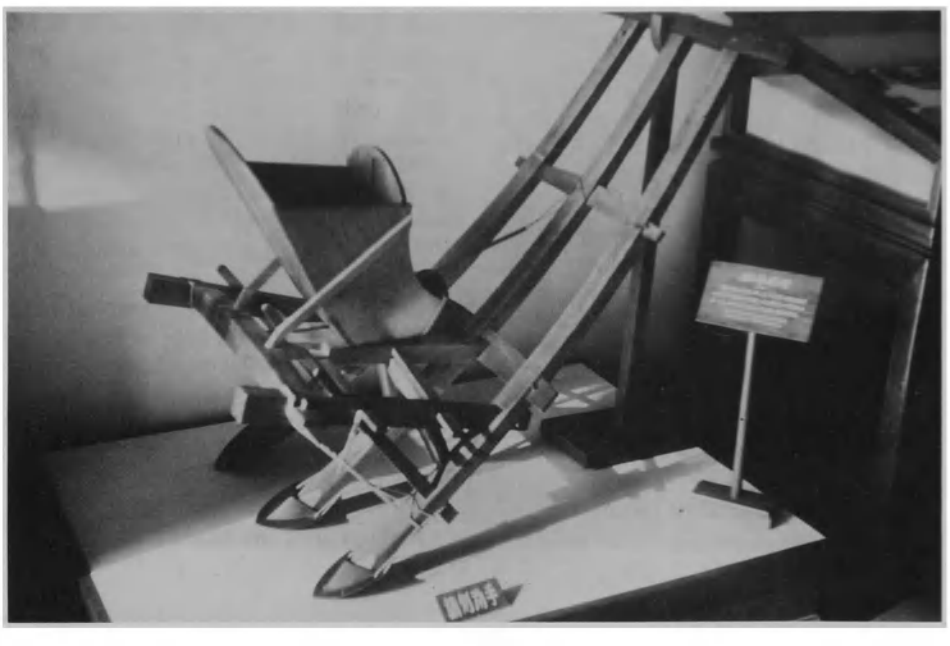


Photo © Angladette, Paris

A series of 18th-century Chinese engravings illustrating the stages in the production of rice: (1) water is introduced into the paddy field which is then harrowed to mix the water into the sun-baked topsoil; (2) rice seedlings are transplanted from the seed beds to the paddy field; (3) the water level is raised as the plants grow; (4) harvesting the crop; (5) sheaves are stacked in ricks; (6) threshing is often carried out on flooring of bamboo slats; (7) rice is ground to remove the hulls.

popular feature was its short growth duration, which meant that it could be harvested before the onset of the continuous heavy rains of autumn.

Large-scale planting of paddy rice brought continuous increases in food production in southern China. In the lower reaches of the Changjiang River and the Taihu Lake Valley, two crops of rice could be harvested a year. Rice production in Suzhou and Huzhou in the Taihu Lake Valley was of national importance. In the words of a popular saying. "A good harvest in Suzhou and Huzhou feeds the whole country."

Rice soon acquired a dominant position among cereals, and it became a regular practice to ship large quantities of grains, principally rice, from the south to the north, setting the pattern of food supply which continued for hundreds of years. The spread of the practice of growing double or even triple crops of rice annually further strengthened the leading position of rice among the grain crops. The rice-producing region in south China became increasingly important to the national economy.

Rice was used in many ways. Besides serving as the main staple food, it was also used to make a great variety of products such as wines, cakes, pastries, and rice flour. According to the book *Anecdotes of Wulin* (Hangzhou) written by Sishui Qianfu during the Southern Song Dynasty period (1127 to 1279 AD), a great many kinds of wines and pastries were found in Hangzhou at that time. About twenty kinds of pastries and nine kinds of rice gruels were listed. There were also special kitchens for making dumplings. In the *Records of Grain Dreams* written by Wu Zimu, detailed lists were made of the kinds of rice and assortments of pastries and cakes and dumplings on sale at the rice shops. The varieties of wines and vinegars made from glutinous rice numbered in the hundreds.

Chinese medical scholars believed paddy rice was capable of "replenishing the body and nourishing energy" and "of consolidating energy and producing saliva". Indeed, the nutrient and medical value of paddy rice is also very well-known. Paddy rice contains the amino acid lysine, which is very high in nutritive value, and the protein content of rice compares favourably with that of other cereals. In administering medical treatment, our ancestors often added rice to their prescriptions with a view to "protecting the stomach, supporting the good and removing the evil within the body."

During the period of convalescence after a serious illness, when stomach energy is still impaired and is awaiting rehabilitation, light soft foods like rice soup or porridge should be taken.

For several thousand years, grain has been the main element in the dietary structure of the Chinese people. Today, material civilization is being highly developed. Western eating habits and new conceptions of nutrition have been introduced into China. The controversy as to whether to take rice as a "major" or "minor" item of diet has arisen in Chinese academic circles. However, looking at the issue from a historical point of view, no matter what great changes the development of science and technology may bring to the dietetic structure of the people in the next century, the prosperity of the Chinese people, the world's most populous nation, is inseparable from the contribution made by the agricultural produce which is their principal food. ■

HU BAOXIN and CHANG SHUJIA *are agronomists with the Bureau of Agriculture of China's Ministry of Agriculture, Animal Husbandry and Fishery.*

On a co-operative farm of the commune of Mar Lu, near Shanghai, the rice crop is harvested with a specially designed, Chinese-built mechanical reaper.

Photo Lin Heung Shing © Contact-Cosmos, Paris

The god who stole the rice

by Obayashi Taryo

ACCORDING to a legend of eastern Japan, told in the Somegawa locality of the Iwate Prefecture, there was, in the beginning, no rice in Japan. One day the god Inari-sama stole some rice grains from Kara (China) which he hid in the hollowed out stem of a large reed. Plugging the open end of the reed with paper, inverting it and using it as a walking-staff, he returned to Japan bringing with him the country's first rice.

Because the god had used an inverted reed to hide the rice grains, a reed is always inverted and stood in the seedling bed. Once the seedlings have been successfully transplanted, it is then safe to stand the reed with its root end down.

Linked to such rice-transplanting rituals and the accompanying myth of Inari-sama (literally, "the rice-carrying god") we find a very old method of preserving rice by parching it. Making *yakigome,* or parched rice, involves roasting the grains of rice and pounding them to remove their outer husks. *Yakigome* may be simply eaten as it is, reparched, or softened by mixing with hot water and served as a hot cereal. In the last few centuries *yakigome* has come to be used primarily as a food-offering to the gods in rituals that take place in the rice paddy.

In eastern Japan, when the rice seedling beds are first sown, the *minakuchi* ceremony is held to bless the water-control inlet where water enters the field from the communal irrigation system.

At Muraoka village, Fujisawa, in the Kanagawa Prefecture, during the *minakuchi* sowing ritual, *yakigome* is presented to the gods and then divided up among the children to be eaten. The *yakigome,* which the happy children spill on the ground around them as they eat it, serves to feed the sparrows and the crows. In this way, it is said, as the seedlings are growing, they are protected from the ravages of hungry birds. Many other localities also used to believe in the efficacy of the ritual involving the spilling or spreading of *yakigome* at the irrigation inlet, to be eaten there by the birds and so prevent them from harming the rice seedlings.

In western Japan, *yakigome* is presented to the gods at the harvest festival, when the first rice of the season is cut with a scythe and presented in a rite of thanksgiving. It was the custom in many areas of western Japan that the first rice should be ritually cut and parched even before the grains were fully ripe. This *yakigome* was offered to the gods and ancestors and also exchanged as a ceremonial gift among the farm households of the village.

Today, *yakigome* is almost exclusively used for ritual purposes, but at one time, along with *hoshii'i,* rice that is first steamed and then dried, *yakigome* was an important and convenient foodstuff for soldiers and travellers.

While *yakigome* is no longer enjoyed as a food, *mochi* remains popular and important in Japanese cuisine. *Mochi* is usually translated into English as "rice cake", which may be misleading because they are made neither with regular boiled rice nor with rice flour. *Mochi* is short-grain glutinous rice steamed until soft and then pounded while hot in a mortar until it becomes a gluey dough with no discernible grains. The dough in turn can be shaped and seasoned in a myriad ways.

Mochi plays an especially important role at the New Year festivities. Throughout Japan it is the custom to arrange round-shaped *mochi* in graduated sizes *(osonae)* in

Photos © Hideo Haga, Japan

In the Aichi district of Japan, on the day the rice seed is sown, flowers are offered to the deity of the rice field at the irrigation water inlet.

After the harvest, in the Noto area, Ishikawa district, Japan, farmers perform the aenokoto *rite in which the deity of the rice field, symbolized by bales of rice seeds, is venerated.*

In a field carpeted with snow, a Japanese peasant family goes through the motions of planting rice. This rite is performed during the first month of the lunar calendar (February) to ensure a good harvest for the following autumn.

On 24 June, in the sacred rice field of the Izawa Shrine, near Ise, Japan, young boys and girls, dressed in red and white kimonos, celebrate the rice-transplanting festival to the accompaniment of drums, rattles and ritual chants. The songs recount the Shinto myth according to which rice was brought to Japan by a white crane and offered to Amaterasu, the goddess of the sun.

the central alcove of the main room. *Mochi* are presented to the family gods and are eaten in a special soup, *o-zoni,* partaken by the family in the first ritual meal on the morning of New Year's Day.

Mochi has also been widely used at religious rituals other than those of the New Year, and today it is a common food served on many occasions. Combined with other ingredients, especially sugar, it is a well-loved sweet and a popular snack food.

Another type of rice-based food with traditional and ritual significance in Japan is *sekihan* (red bean rice) which is a short-grain glutinous rice steamed with small red beans *(azuki)* that impart a distinctive and auspicious red hue. Today, rather than steaming, many housewives simply add red beans to their regular rice as they boil it in order to make *sekihan. Sekihan* has traditionally appeared at a variety of rituals, while today it is often served on occasions of celebration such as birthdays. *Sekihan* is also dished up on less happy occasions; in the northern Tohoku region it is served at wakes and funerals.

Although some scholars are less than satisfied with the explanation, it is said that the red *sekihan* is an attempt to reproduce on special occasions a reddish variety of rice that was cultivated in ancient times. In the sacred rice paddy of Homan Shrine, Tanegashima Island, in the Kagoshima Prefecture, they grow a variety of red rice for ceremonial presentation to the god. At several other locations reddish rice is grown for a ritual function. Red types of rice are also found in China and southeast Asia.

Red bean rice porridge, *azuki-gayu,* is similar to *sekihan. Azuki-gayu* is made by simmering the small red beans with regular, medium-grain rice in lots of liquid until it attains a thick consistency. This is served on the fifteenth day after the lunar New Year's Day. In some regions it is customary for men, not women, to prepare the porridge.

The fifteenth day after the lunar New Year, called the "Little New Year", was formerly a day on which many agricultural rituals were performed. Indeed, it is a characteristic Japanese custom to ensure the success of the year's crops by means of rituals and ceremonies held on this day, long before actual planting time.

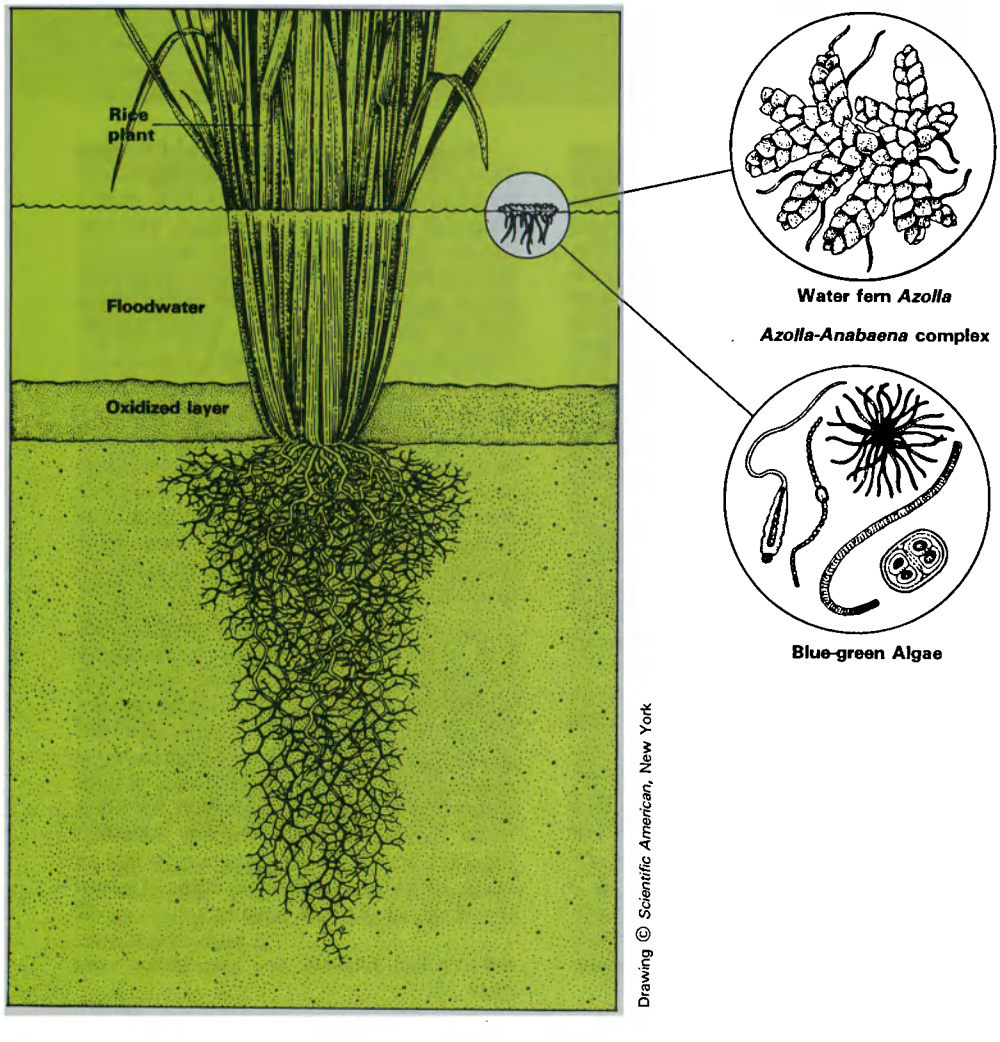
Two important customs of the Little New Year are rituals that reproduce the actual activities of farming—dances that mimic transplanting the rice seedlings, and the decoration of homes and farm buildings by placing branches of trees hung with such things as *mochi* to represent prolific rice with full heads of grain.

Traditionally, *mochi* and *sekihan* were cooked in steamers; indeed, until the Middle Ages, regular rice was not directly boiled but prepared in steamers of earthenware or wood. Today, a few households still boil their rice in large iron pots with heavy lids *(kama)* over charcoal fires. Since the Second World War, however, these have been mostly replaced by electric or gas automatic rice cookers.

The work of agricultural households has also been revolutionized by new technology. Rice cultivation has been mechanized and the number of Japanese families engaged full-time in agriculture has dropped dramatically. Traditional agricultural rituals have largely disappeared. Traditional foods made from rice have lost their ritual significance and religious meaning. Families no longer grow their own rice or make *mochi* or *sekihan* at home. Instead they buy ready-made products. ■

OBAYASHI TARYO. *See biographical note page 13.*

Photo © José Mayans, Paris



Drawing © *Scientific American*, New York

Nature's nitrogen factory

To the untrained eye the floating mass of vegetation to be seen on the paddy fields of Viet Nam looks as if it is choking the life out of the young rice plants. In fact, it is nature's way of providing the rice with a supplement of all-important nitrogen that promotes healthy growth and increases rice yield. This natural, floating nitrogen "factory" consists of two plants, the water fern Azolla *and the blue green alga* Anabaena azollae, *that live together in a symbiotic association. Azolla, the host plant, provides a safe home in cavities in its leaves for the Anabaena alga which in return collects sufficient nitrogen from the atmosphere to meet its own and its host's total nitrogen requirements. Some of the nitrogen thus "fixed" finds its way into the water of the paddy field where it is taken up by the rice plants; but Azolla is most effective as a rich nitrogen source when it is ploughed into the soil of the paddy field during the fallow season as a "green manure". Photos: (1) The blue-green alga* Anabaena azollae. *(2) Azolla is propagated in ponds during the summer and autumn. It spreads with astonishing speed, doubling the surface of water it covers within a week. (3) A much magnified image of the Azolla plant as seen by an electron scanning microscope. (4) During the 17th century this temple was erected in the village of La Van, Thai Binh Province, Viet Nam, in honour of the legendary monk Khong Minh Khong who is credited with having initiated the Azolla fertilizer technique.*

Green winters on the Red River

by Dao The Tuan

IN the northern regions of the Socialist Republic of Viet Nam, the cultivation of rice is closely linked with that of *Azolla,* a water fern which, in association with the blue-green alga *Anabaena azollae,* has the ability to fix nitrogen from the atmosphere. Nitrogen is a key factor in increasing the yield of rice obtainable from a given area of cultivated land.

For centuries Azolla has been used in the paddy fields as a "green manure" for winter rice. The term "winter rice" designates a group of rice varieties that are specific to the Red River delta which were developed by our ancestors to grow in the deep water paddy fields of the river plain.

Being comparatively resistant to cold, the Azolla of Viet Nam *(Azolla Pinnata)* is well adapted to the winter climate of the Republic. During summer and autumn, Azolla is propagated in ponds in a few villages in the Thai Binh Province in order to produce spores, or *inocula*. These are then sold to other villages to be scattered in the winter rice fields after the transplantation of the rice seedlings in January. There the Azolla grows and spreads until, by about the month of March, when the rice is ripe for harvesting, it covers the entire surface of the water. After the rice has been harvested, this mass of greenery is ploughed into the ground where it decomposes, releasing nitrogen into the soil. A layer of Azolla covering a one-hectare rice field produces about 10 tonnes of fresh vegetation, which is equivalent to 25 kilograms of nitrogen.

The exact date when peasant-farmers first began to use Azolla in the rice fields of Viet Nam is not known. According to popular legend, a giant Buddhist monk named Khong Minh Khong, who lived in the eleventh century during the period of the Ly dynasty, was carrying on his shoulders a yoke on which were hung two large baskets of Azolla. As he was passing near the Red River, he dropped his load of Azolla on the rice fields of two or three villages. As a result, only the peasants of these villages knew the secret of the propagation of Azolla.

During the seventeenth century a temple was erected to the honour of Khong Minh Khong in recognition of his role as founder of the Azolla technique. However, according to another legend, the discovery of the properties of Azolla is attributed to a woman, the goddess of Azolla.

Towards the end of the seventeenth century, the inhabitants of three villages in northern Viet Nam, La Van, Bung and Bich Du, in Thai Binh Province, are known to have selected wild Azolla plants which, during the summer months, they raised in flower pots and then in ponds sheltered from the heat of the sun by hedges of bamboo. The *inocula* thus produced were then sold to other farmers of the region. By about 1945, some 40,000 hectares of rice fields were sown with nitrogen-fixing Azolla.

During the 1950s, this traditional technique was studied by agronomists and passed on to all rice farmers. By using super-phosphates in place of the manure and ashes previously employed to fertilize the Azolla, and by making greater use of insecticides, the propagation of Azolla was considerably improved. As a result, during the 1960s and 1970s, Azolla contributed to an important increase in the rice crop in Viet Nam. Since then, with the introduction of new varieties of rice, methods have changed. Azolla is propagated in the paddy fields before the transplantation of the spring rice seedlings, which takes place in February.

Today, the use of Azolla is encountering certain difficulties. It is labour-intensive, and the shortage of super-phosphates and insecticides has impeded the development of the Azolla technique. These problems are now the subject of research in Viet Nam. Indeed, during the last few years research scientists throughout the world have begun to study this interesting plant with the aim of developing its use in other countries. It is to be hoped that current problems will be overcome and that Azolla will continue to make a contribution to the task of increasing world rice production. ■

DAO THE TUAN *is director of the Viet Nam Agricultural Science Institute at the Ministry of Agriculture, Hanoi. A specialist in plant physiology, he has carried out extensive research into the physiology of rice and the Azolla plant described in his article.*

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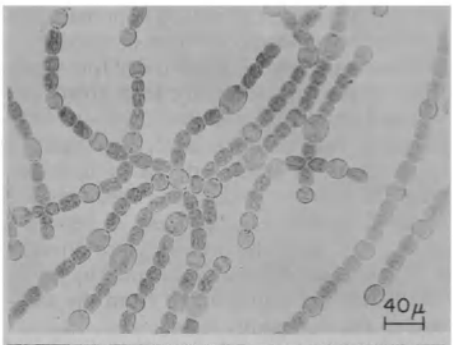

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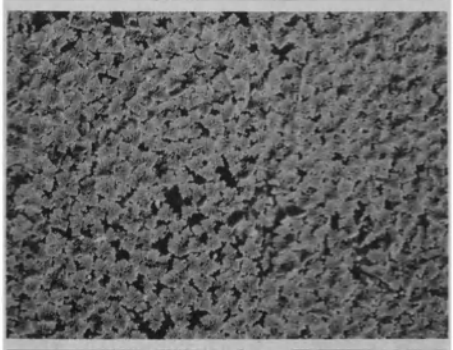

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Photo © Battelle-Kettering, Yellow Springs, USA

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Photos © Institute of Agronomic Sciences, Viet Nam

A HOUSEHOLD GOD

by Lee Kwang-Gyu

THE Korean peninsula is a mountainous area only one-fifth of which is available for cultivation. Rice-growing is possible, especially in the south, thanks to the hot summer and abundant rainfall amounting to 800-1,000 millimetres a year. Sixty per cent of the precipitation occurs in the summer months from June to early September.

What are the origins of rice cultivation on the Korean peninsula? When and how did it begin? Of eleven archaeological sites that have yielded evidence for rice cultivation, the two earliest, Naju in the southwest and Hunam-ri in the middle of the peninsula, date back to sometime between the eleventh and the thirteenth century BC, the early Bronze Age in Korea.

Archaeologists have suggested that rice may have reached Korea from south China in two ways—via a land route through northern China and via a sea route across the Yellow Sea from central China, as an extension of the Lungshan culture in China. Another hypothesis has been put forward by agriculturists, who contend that rice came to Korea from north China because the Japonica rice and the dry rice found in Korea today are grown in north China.

The earliest type of rice cultivation was by dry farming, with the land being prepared using the slash-and-burn method. Wet rice cultivation seems to have been adopted in the first century AD, and the construction of large-scale bank revetment and irrigation systems in the second and third centuries is reported in *Sam-guk-sa-gi,* the History of the Three Kingdoms in Korea.

During the Koryo dynasty (918-1392) which followed the Three Kingdoms, rice became the country's major crop. The Choson dynasty (1392-1910) developed agriculture and especially rice-growing, even further. Rice even became a form of currency, along with metal coin and cloth. Officials were paid in rice, and paddy fields were allotted to them according to their rank.

Rice is still very important in Korean life today. As in other parts of southeast Asia it is the principal food of the people. It is served three times daily, and is the main dish around which all other foods are disposed. Even when a rich variety of food is served, a meal is not considered a meal unless it includes rice.

For purposes of the daily diet, rice is thoroughly washed, then boiled vigorously for five minutes, simmered for ten minutes, and left unheated to steam for another five minutes. Sometimes it is also boiled with barley, soybeans, red beans, or millet.

Rice is also used for making gruel, cakes, and wine. Rice gruel or porridge is made with polished white rice for infants, the sick, and the elderly, and is served with or without side dishes. Over a hundred varieties of rice cakes and confectionery are made with rice flour derived from both glutinous and non-glutinous rice. Different rice cakes are prepared for different occasions such as seasonal holidays, ritual services for ancestors, birthdays, weddings and festivals.

Wine is made from rice by mixing steamed rice with fermented leaven made from wheat bran and water. There are three main kinds of rice wine: the first is a turbid brew called *Makulli;* the second is a clear beverage called *Yakju;* and the third is a distilled liquor called *Soju.*

Because of climatic limitations, only one rice crop is grown each year, and in the southern part of the peninsula the fields are used for barley in winter and rice in summer. In the central part of the peninsula, rice cultivation begins with the washing of the seeds in late March or early April by solar calendar. The high-quality seeds, preserved from the previous year's harvest, are first washed in salty water to free them from their husks and then washed again to remove the salt.

In the sunniest part of the paddy, furrows one metre wide are ploughed in preparation for seedbeds which are then covered with grass and ash and allowed to dry for two or three days. Rice seeds are then sown and watered generously so that they sink into the soil. Fifteen days later, the water is drained out of the seedbeds in order to stabilize the roots; then the seedbeds are watered again. This process is repeated twice, and then the seedbeds are covered with compost. After about a month, young rice plants are transplanted from the seedbed to the rice paddy field.

Prior to transplantation the paddy is ploughed. Oxen were used for this purpose in the past but today they are rapidly being replaced by the power tiller. The field must be levelled before it can be flooded to receive the seedlings. The farmer must reinforce the retaining banks of the field and spread fertilizer, now using chemical fertilizers whereas in the past dung, muck, ash and grass were used.

The young rice plants are planted a fixed distance from each other, and are aligned using a rope in which equidistant knots have been tied. Men and women plant in single file. Planting must be done in the traditional way by hand as the complexities involved in the development of the mechanization of transplantation work have yet to be solved.

In earlier times rice fields were weeded three times a year; this was a long and laborious task whether hoes were used or whether the work was done by hand. Today chemical herbicides have largely eliminated the need for weeding by hand.

Threshing Floor *and* Farmers turning the Soil, *two stages in the cultivation of rice painted by Kim Hong-do, a famous 18th-century Korean artist. Left, watched by their master, the peasants thresh the sheaves of rice. Right, scenes such as this, of peasants ploughing and preparing the soil, can still sometimes be seen in the Korean countryside today.*

Photos © National Museum of Korea, Seoul, Republic of Korea

Photo © Korean National Commission for Unesco, Seoul

The tug-of-war contests that traditionally take place in January in villages in the southern part of the Korean peninsula are preceded by loop fights—lively contests between two teams equipped with 100-metre-long ropes to the end of which are attached huge loops made of straw and wood. The loop fight is a pushing contest the aim of which is to force the opposing team's loop to the ground. Team leaders sit astride the rope or stand on the loops which are held up on wooden poles by the 50- to 80-strong teams. The combination of men, ropes and loops makes the entire scene look curiously like a fight between two huge dragons.

In early October the rice is harvested within a period lasting ten days or so. Because of this time limitation, concentrated effort is required of the farmer. After being dried, the seeds are taken from the plants by thresher a few weeks after the harvest.

The typical farming village is located near the rice field, at the foot of a mountain. Farmers say that they must be able to look after the rice plants every day and that if a plant is neglected it will fade away like an abandoned child.

Most villages have a band in which the farmers play at harvest time, on seasonal holidays, or after the ritual service for a village god on the day of the first full moon by the lunar calendar, when many villages, especially in the southern part of the peninsula, engage in tug-of-war competitions. This custom is also practiced elsewhere in southeast Asia.

Above all rice is worshipped as the housegod in farming villages. Rice in a small jar is the main symbol of the housegod. In the central regions of the peninsula it is placed in the back yard, while in other regions it is kept in the inner room.

The housewife offers rice cakes before the god once a year, praying for good luck for the family farm and for the good health of the family.

Even today people feel uneasy if the rice harvest has been poor, despite the knowledge that imported rice will offset any shortages. The opposite is also true. People feel happy and fulfilled when the harvest is bountiful, behaving generously and forgiving past wrongs. In short, despite modernization and industrialization, rice is still the most important element in Korean social, economic, and cultural life. ■

LEE KWANG-GYU, *of the Republic of Korea, is a professor at the College of Social Sciences, Seoul National University, and a former President (1976-1979) of his country's Society for Cultural Anthropology. He is the author of many studies on family structure and kinship in his country and elsewhere in east Asia.*

Photo Alexis Vorontzoff, Unesco

Wat (temple) Mahathat is situated at the heart of the ruined city of old Sukhothai, the cradle of Thai civilization.

Unearthed in central Thailand, this brick contains rice husks, evidence that rice was grown in the ancient kingdom of Dvaravati which flourished in the region from the 6th to the 13th century.

Photo © Thai Delegation, Unesco

A CITY BUILT ON RICE

by Srisakra Vallibhotama

IN Thai history, the significance of rice for the development of the State is related to a cultural practice called *kalapana,* the act of endowing sacred monuments or objects with land, labour and goods. This practice resulted in increasing the number of village communities producing rice for subsistence.

The rationale behind this practice was that Thailand was a sparsely populated country so that manpower was at a premium in order to provide for the security and prosperity of the State. Manpower could be obtained in several ways. The harsh solution was to wage war and organize raids in the hope of capturing large numbers of families. A gentler solution was to offer protection to refugees or to persuade merchants and travellers to come and settle in the country. To assimilate these people of different origins into society, it was necessary to build a community to which they could feel they belonged.

With this in mind the ruler would establish a religious monument or a shrine in a given place and for its upkeep he would perform an act of *kalapana,* donating a number of families, draft animals and objects to the site in question. As a rule such families were brought from outside. They would clear the land, turn forest into paddy, make homes for themselves, and look after the religious monument. In this way a peasant community was created, to become not only a unit of the wider society but a supplier of labour to the State to which it belonged. Accordingly, any assessment of the strength and persistence of a Thai city or State in the past must take into account not only its size but also the number of religious sites associated with rice-land in the surrounding area.

The State of Sukhothai, which emerged in the thirteenth century and is generally accepted as the earliest Thai kingdom in Thailand, is a case in point. An inscription records of its greatest ruler, Ram Kam Haeng, that before he became king he had honestly served his father and elder brother in waging war against other States and had taken many captives, whom he did not kill or torture but made citizens of Sukhothai. When he became king he persuaded merchants and travellers from outside his kingdom to trade freely in Sukhothai and settle there.

The city of Sukhothai was a large settlement surrounded with triple walls and provided with large ponds for drinking water. There were four main gates at the cardinal points through which people thronged on special religious occasions to pay homage to the Buddha at the heart of the city. Around Sukhothai there were orchards and temples to the great Buddha; to the south and west were the living quarters of monks, while to the north and east were rice-lands and villages.

During the lifetime of King Ram Kam Haeng, the Sukhothai State was prosperous: "there is fish in the water and rice in the fields" runs a famous saying associated with him. In order to integrate outsiders into the Sukhothai State the King built *wat* (Buddhist monasteries) donating rice-land, labour and goods to form the basis of village communities. We know that this practice continued, for many later Sukhothai inscriptions mention how members of the royal family and bureaucrats followed in his footsteps and restored or built roads, bridges, weirs and canals which were necessary for communication and rice cultivation.

The city of Sukhothai was, and still is, situated near the slope of a mountain surrounded by low-lying land to the north and east where rice is grown. These lowland areas are dotted with ruins of temples and *stupas* indicating the centres of peasant villages. The main source of water for rice cultivation was the Mae Lampan river which passes by the city from north to east before flowing into the Yom River about eleven kilometres away.

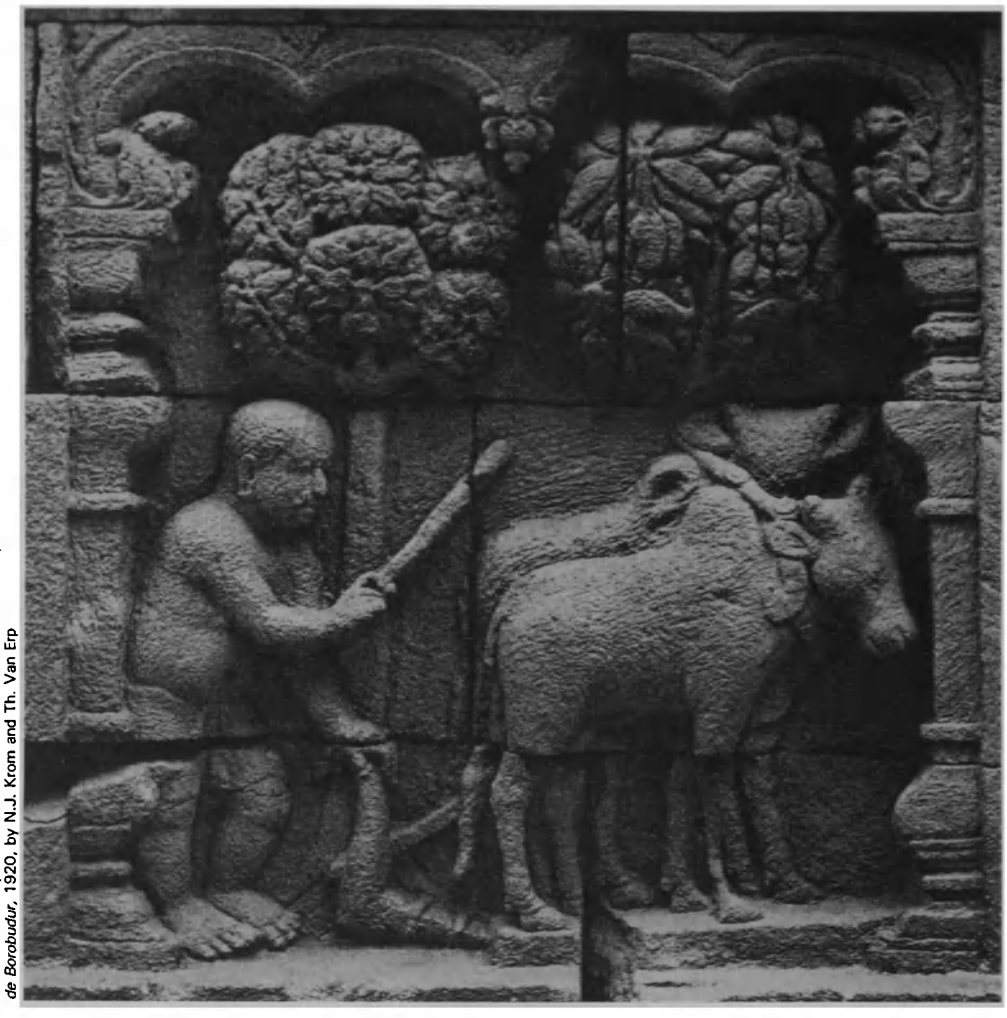
Traces of ancient weirs and irrigation channels can be seen on the northern and eastern banks of the river, indicating hydraulic facilities provided by the State for the rice-growing communities formed as the result of *kalapana.* In addition there is a large rectangular area bounded by earthen dykes near the northeastern corner of the city which was reserved for rice cultivation.

These remains of ancient irrigation works are a unique feature of the city which still bear witness to the attempts of the rulers of Sukhothai to grow sufficient rice to ensure the survival of the city and its people in a region prone to drought and where the quality of the soil is poor. ■

SRISAKRA VALLIBHOTAMA, *Thai historian and social anthropologist, has been associate professor of anthropology at Silpakorn University, Bangkok, since 1980. In 1977 he was seconded as chief sociologist to the Sukhothai Historical Park Development Project, working in conjunction with Unesco, and in 1980 he was a visiting professor at Cornell University, USA.*

Rice is Thailand's major crop, the basic food of the Thai people, and the country's most important export.

Photo E. Kennedy, FAO, Rome



Photos Jean-Loup Charmet, *Unesco Courier*. Taken from *Description de Borobudur*, 1920, by N.J. Krom and Th. Van Erp

Photo © Vautier de Nanxe. The Puri Lukisan Museum, Ubud, Indonesia

Thousand-year-old roots of Java's rice

The rice-farmer patiently plodding behind his buffalo-drawn plough was already a familiar sight in the island of Java (Indonesia) at least a thousand years ago. This is one of the messages of the hundreds of realistically carved stone bas-reliefs (above), many depicting scenes from everyday life, that wind around the walls of the great ninth-century Buddhist sanctuary of Borobudur (see Unesco Courier, *February 1983). Another relief (below) shows a harvest scene with men and women cutting rice in the field and carrying the bound rice-sheaves on their shoulders. In the densely populated plains of Java today, where the villages are islands of vegetation rising out of the flooded rice-fields, the buffalo may be giving way to the motorized cultivator and other machines but the old rice myths and traditions die hard. In Java rice is associated with fertility and was considered as feminine, the incarnation of the goddess Dewi Sri. Men were subject to many prohibitions where rice was concerned. They were forbidden to cook it, and although they always prepared the land it was the women who planted and otherwise handled the rice. Every stage in rice cultivation and processing was an opportunity to pay respect to Dewi Sri and an occasion for mutual aid. Rice was held in higher esteem than other crops such as maize or cassava.*

Colour page

The Rice Harvest, *by M. Runia (Bali).*

'Never eat rice in the dark...'

Photos © François Dupuy, Paris

Proverbs from the Philippines selected by Samuel K. Tan

Professor of history, University of the Philippines.

• Never eat rice in the dark or you will attract the evil spirit called *momo* (the ghost). You might even swallow the evil spirit and bring misfortune upon yourself.

• If anyone wastes rice or throws it away, his hand will become deformed and he will never know abundance or prosperity.

• If you give rice to a beggar, offer it to him on a plate and not in the *pangtakal* (measuring cup), otherwise your supply of rice and food will diminish.

• Never place the measuring cup in the rice bin upside down for this may result in a bad harvest.

On the steep slopes of the mountains in the north of Luzon, the largest island of the Philippines, the Ifugaos people, with great skill and enormous effort, have carved out an amazing complex of irrigated rice terraces. Creation of this complex involved the construction of 20,000 kilometres of revetments, including 7,000 kilometres of stone walls. Above, the Ifugao village of Batud. Right, an effigy of the rice goddess, photographed in Batud.

• Rice should never be lent or given away at night or early in the morning because this brings bad luck. Rice may, however, be bought at night.

• Showering rice on newly-weds brings prosperity both to the couple and to the person who throws the rice.

• Rice must be washed three times for this is in keeping with the ancient ways.

• It is best to plant during a full moon and on a clear and starry night for this will ensure a good harvest.

• Sundays, Mondays, the first day of August and odd-dated days are inauspicious for planting. Even-dated Wednesdays and Fridays are the best days for planting for they bring a plentiful harvest and healthy grains, especially if the planting is accompanied by prayers.

• When planting, the planter should have a full stomach for this brings good luck and fruitful days and months ahead. When planting is completed, the planter should let out a great shout to signify that the day has ended in triumph over adverse conditions and unforeseen eventualities.

• Harvest-time is the most keenly-awaited period in the cycle of rice cultivation and harvesting should be carried out before the dew and morning mists have disappeared. This will bring speedy good fortune to the people. ■

Colour page

A cook prepares a meal of rice for distribution to volunteers working on the construction of a rice-field irrigation canal in the province of Da Nang, Viet Nam.

Photo © Jacques Lescanff, Paris

THE SOUL OF A PEOPLE

by Zainal Kling

IN Malaysia, it was traditionally believed that rice, or paddy, was animated by a soul—the rice soul (*semangat padi*). The *semangat* (soul) is a generalized idea or notion of a vital principle which enlivens and animates objects and living things in this world. It is the extra vitality or vigour complementing the life principle *(nyawa)* in living beings or the intrinsic power embodied in magical objects and is variously conceived as "a diminutive but exact counterpart of its own embodiment", or as appearing in the form of an insect, a bird, or an animal. Nevertheless, in the central part of the Malaysian peninsula an anthropomorphic conception of the rice soul was often encountered in myth:

"In olden times, rice was not harvested from the fields. Every morning a grain would appear in the house of the farmer and find its way into the rice cooking pot. The housewife would normally cook the rice grain without even opening the pot cover, which was taboo *(pantang)*. By the afternoon the pot would be full of rice ready for consumption.

"One morning, the housewife planned to leave the house for her farm and therefore she warned her children never to open the rice pot during her absence. Once the mother had gone, one of the younger children grew curious and tried to open the pot. Unbeknownst to her elder sister she peeped into the pot and saw a little girl inside. Suddenly the little girl disappeared leaving only a small grain of rice. Her elder sister was very angry and scolded her severely.

"When their mother returned, she found that there was no rice in the pot. She knew that it had been opened and scolded her younger daughter for disobeying her instructions and breaking the taboo. But it was no good crying over spilt milk, and from that day onwards they had to work very hard to plant the rice, harvest it, and then carry home all the grains."

The anthropomorphic conception was further elaborated by a series of endearing names used to address the rice soul in invocations and incantations during various rites, especially at first harvest *(menuai sulung)*. The soul was adored like a newborn baby and lovingly addressed as "the nine-month baby" *(anak sembilan bulan)*, "sunray princess" *(anak maharaja cahaya)*, or "the crystal princess" *(si dang gemala)*. This human treatment of rice reflects the inherent Malay attitude of treating all humanity with the utmost respect and kindness.

The rice soul was also regarded as a manikin, or thumbling, with the most sensitive feelings which could be easily offended and hurt. It had to be handled with caution, like a fragile, vulnerable baby or, as the Malay saying puts it, as though "handling a flat-bottomed tray brimful of cooking oil" *(menatang minyak yang penu)*. These human characteristics symbolically project the personality traits generally displayed by Malays themselves, for as a people they are sensitive and unassuming, easily offended and shamed by harsh words and treatment.

The human attributes of the rice soul became the focus of complex rituals and elaborate ceremonies with a strong emotional content which built up to almost cultic veneration and adoration in the various rites throughout the cycle of rice cultivation. From the first step of selecting rice seeds, to the process of growing,

***Each year in May, the Kadazan and Murut villagers of Sabah (Malaysia), celebrate the rice harvest with one of the most important traditional ceremonies in their cultural life. The festivities begin with the celebration of* magavau, *a ritual in which the "soul" of the rice is carried from the rice-field to the home of its owner. Then, to the beating of drums and gongs, the* bobohizan *or Kadazan priestesses perform the* sumazau, *the Kadazans' best-loved dance, and the head priestess begs for a good harvest the following year. The people join in the dance, the traditional way of expressing everlasting gratitude to their creator* Kinoingan *for sacrificing his only daughter* Huminodun *so that the different parts of her body could become food for the starving people. Rice is the embodiment of the spirit or soul of* Huminodun.

Photos © Gilbert Khoo, Kuala Lumpur

transplanting and weeding and up to the time of the first harvest, the final storage and the first tasting of the crop, a series of rituals was carried out to express the primordial need for a good harvest and the survival of the community from hunger and starvation.

The souls were entreated and invoked to remain with the rice and not to abandon its rice-seed embodiment or the community. The ritual specialist, the *Pawang,* would tenderly cradle a handful of seeds at the beginning of the sowing ceremony or during the cutting of the first few stalks at the first harvest. The *Pawang's* entire attitude would be one of appeasement and tender care of the soul against human violation or destruction by malignant spirits. The first few stalks were cut with a small palm-size reaping knife to avoid hurting the tender soul or inflicting violence on the ears of rice.

Female *Pawang,* or housewives, would normally invite the soul, believed to be embodied in a selection of the best of the newly-reaped seeds, to return home with them. The first seven ears of rice to be reaped were swaddled and tenderly placed in a specially-made basket, the cradle of the rice soul. The basket would then be carefully kept in the rice store for next year's cultivation. Whatever interpretation may be placed on these various rituals, they nevertheless clearly suggest a strong notion of the rites of fertility, the concept of "mother earth" and rebirth in the "mother seeds" *(ibu benith),* the receptacle of the child-like rice soul.

For generations these attitudes and rites were part and parcel of the Malay cultural system as reflected in rice cultivation, until modern technologies reduced them to mere memories, to sub-conscious skills to be briefly recalled during a particularly bad harvest or a period of unfavourable planting conditions. In the modern technological context of machinery, chemical fertilizers, irrigation systems and hybrid seeds, the idea of rice souls and ritual ceremonies seem more and more irrational and meaningless. ■

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Photo © SSOD, Moscow

A 'Plov' is as good as a feast

by Boris V. Andrianov

PLOV, the national dish of Uzbekistan, is relished not only by the Uzbeks but by the peoples of many other regions of the Soviet Union. Fragrant, hot, ready to melt in the mouth, the rice is cooked with carrots, onions, and garlic, and served in white mountains on a huge platter with morsels of mutton or beef. Among the Uzbeks, the Kara-Kalpaks, the Tajiks and other peoples of central Asia, it is the favourite dish for high days and holidays.

Rice cultivation came to central Asia from more southerly Asian countries where irrigation and cereal farming appeared in the sixth-fifth millennia of the pre-Christian era. In the second half of the third millennium and the beginning of the second, the area under cultivation grew considerably, and archaeologists believe that an urban civilization emerged in south-central Asia during this period in an area where two influences converged: the influence of Sumer and Elam in the west, and the influence of the ancient Indian civilizations of the Indus plain in the south.

Links with India undoubtedly favoured the emergence of irrigated rice cultivation in central Asia. As yet there is not enough archaeological evidence to give a precise date to this development, but clearly it could only have occurred when the peoples of central Asia had learned how to build vast and complex irrigation networks, a phenomenon connected with the appearance in the cultivated oases of major urban trading centres.

In central Asia as in many other regions of Antiquity with an arid climate the frontiers of the earliest State structures largely corresponded

This head chef of a restaurant in Samarkand, Uzbek SSR, in central Asia, is renowned as a master in the art of preparing* Plov, *a favourite rice dish of the Uzbeks and peoples of many other regions of the USSR.

to the limits of irrigated land. At the end of the second and the beginning of the last millennium of the pre-Christian era, this accounted for the territorial outline of many countries, including Bactria which developed on the upper course of the Amu Darya and its tributaries, Dagestan on the Terek, Margiana on the Murghab, Parthia in the foothills of the Kopet-Dag mountains, Sogdiana in the valley of the Zeravshan, and Khorezm in the ancient delta of the Amu-Darya. The Greek historian Herodotus (c. 484-420 BC) mentions an irrigation installation on the river Ak (Akes) which watered land on the borders of Khorezm, Hyrcania and Parthia.

Under the Persian Achaeminid dynasty (sixth-fourth centuries BC) which dominated a large part of central Asia, the development of agriculture was stimulated by the construction of canals, and wheat, barley, millet and many other crops were grown, including the vine, and possibly rice. When Alexander the Great was treading the path of conquest to India around 327 BC, rice was fairly widely grown in Bactria.

According to Chinese sources, rice-growing was widespread in central Asia in the second century of the pre-Christian era. The traveller and diplomat Zhang Qian tells how in Fergana and Parthia "the way of life is sedentary, agriculture is practiced, rice and wheat are sown; wine is taken from the vine". The results of archaeological excavations, especially in ancient Margia, confirm this description.

In very early times, rice and the dishes prepared with it became part of the daily life of many peoples of central Asia. But rice was primarily the food of the rich who had the means to prepare *plov* or boiled rice almost every day. At the beginning of this century, moderately well off families still only made *plov* once a week at most. For the poor it was a dish eaten at banquets given by the rich, and on ceremonial occasions such as weddings, funerals, and the new year festival *(navruz)*.

Even today, among several peoples of central Asia, *plov* and other rice-based dishes are cooked at the home of the bride and bridegroom and served at weddings. Another custom which has survived is for groups of young men to club together and regale themselves at *plov* picnics, with each member of the group paying his share.

Rice has always been an important ingredient in the ritual food served at funerals. The meal begins with rice cooked in milk, which is, according to an old religious tradition, a sacred dish fit only for the servants of the cult, the khans (chiefs) and their entourage. Rice cooked in milk was rarely eaten by the mass of the people, who believed nevertheless in its curative properties and fed it to those suffering from stomach ailments and nursing mothers in need of energy and milk. All kinds of popular beliefs are thus associated with rice, considered to be sacred. It was regarded as sinful to spill rice in a dirty place.

In former times in central Asia rice was only grown on land belonging to the wealthy and powerful. From the second half of the nineteenth century on, however, when most of this region became part of Russia, the poor peasants began to grow rice for the market, on rented land.

Today rice has entered every household, thanks to common ownership of land and water, the use of fertilizer, machines for harvesting rice, and the appearance of new varieties. *Plov* prepared in giant saucepans is sold in the streets, and it is widely available in cafés, canteens and restaurants.

There are over forty recipes for *plov*, using meat, vegetables, salads, raisins, etc. The art is proudly transmitted from generation to generation. Cooking *plov* requires plenty of strength and stamina! A saucepan may contain anything from 50 to 300 kilograms of food... For each kilogram of rice the cook must add an equal quantity of meat, carrots and onions, not forgetting condiments such as barberry, chestnuts, and macerated quinces which give *plov* its distinctive taste. And woe betide the cook who does not know how to boil rice so that the grains don't stick together! Then, when the dish is ready, hundreds of trenchermen gather for the feast.

The area of rice-growing land has greatly increased. It has risen from just over 150,000 hectares in 1913, to more than 800,000 hectares today. The main rice-growing areas of the Soviet Union are in central Asia, but rice is today grown slightly further north, thanks to the development of new varieties obtained by selection. In the European part of the Soviet Union the most extensive and highly mechanized rice-growing region is in the Kuban basin north of the Caucasus. ■

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A family get-together on a kolkhoz (collective farm) in Uzbekistan. The kolkhoz produces both rice and cotton.

Photo © APN, Paris

A touchstone of time and place

by Rafaralahy Bemananjara

Photo © Nicole Boulfroy, Paris

Winnowing rice near Antananarivo, Madagascar. After the harvest the sheaves of rice are beaten against a stone to separate the grain from the panicle, or head. The grain is then collected into baskets. The winnower places the basket on his or her head and allows a stream of grain to trickle through the outstretched fingers of the hand; the husks and chaff are blown away while the grains fall in a heap on to a piece of matting.

THE island of Madagascar is a particularly interesting example of a "rice civilization". Known as *vary* or *vare,* rice is the staple food of the island's nine and a half million inhabitants and holds pride of place in both their material and spiritual life.

In the past, rice was one of the yardsticks by reference to which the Malagasy situated themselves in both time and space. The basic unit employed in traditional systems of measuring time was "the time it takes to cook rice" (*indray mahamasa-bary),* a period of between thirty minutes and one hour, depending upon the fuel and the type of cooking utensil used and the quantity of rice cooked. The distance to a given place would be described, for example, as being "twice or three times the time it takes to cook rice".

The growth cycle of rice was the peasants' calendar. Sowing time, *mamafy ketsa,* covered roughly the months of July and August, while the transplanting period, *manetsa vary,* generally corresponded to October and November. People commonly spoke of events as occurring before, during or after the *mitera-bary* (literally, "when the rice gives birth"), that is, when the grains of rice appeared, or *mena vary,* the harvest period when the rice fields were covered with a carpet of gold.

Rice also provided a standard for other measurements, in particular large measures of volume; the *vary iray* (literally, "a rice") was roughly equivalent to 1.2 hectolitres, and the most common measure, the *fahefabary* or *fahefany,* was the equivalent of half a dekalitre.

Composite names based on the word *vary* (rice) were also used to designate units of money. Shortly before the arrival of the Europeans, and particularly during the first tentative moves towards unification around the end of the eighteenth century, markets were established around the capital, An-

Wooden mortar from Majunga, Madagascar, used for pounding rice.

Photos © Musée de l'Homme, Paris

Bamboo rice measure, 13.5 cm in height, decorated with poker-work representations of a horseman, a rowing-boat and a palace. It comes from Fianarantsoa, a large agricultural market-town on the central plateau of Madagascar, to the south of Antananarivo.

Towards the end of the 18th century in Madagascar, foreign currency cut into segments, like these pieces of silver money found at Antananarivo, was used as a means of payment. The value of each segment depended upon its weight as measured against the weight of a grain of rice. The smallest unit of currency was the varifitoventy ***(the weight of seven grains of rice).***

Photo M. Delaplanche © Musée de l'Homme, Paris

tananarivo, and an attempt was made to regularize exchange transactions. Foreign currency cut into segments was used as a means of payment, its value being determined by weight. Here again the standard adopted was a grain of rice. The *variraiventy* ("a grain of rice") was the equivalent in weight of the seven hundred and twentieth part of a piastre and became the basis for the denomination of monetary units. Thus the smallest monetary unit used was the *varifitoventy* (the weight of seven grains of rice). The word *variraiventy* is still employed but only in a particular negative idiom—*tsy am-bariraiventy* or *tsy manam bariraiventy*—which mean, "without a sou", or penniless.

The use of the word *vary* is not, however, confined to quantifiable applications such as measurements of time, place and weight, and it often appears in idioms that express value judgments on people or actions. To express his appreciation of an act or gesture a Malagasy would say: "That is truly rice *(vary)* cooked in milk and topped with honey", in other words, perfection itself, the best the world has to offer.

One defect of rice—the fact that, when it is fully grown, if it is blown over by the wind it is unable to regain an upright position—was acknowledged by the Malagasy of the past and is still embodied in a popular expression. Someone who gives rein to his vices is said to be *"nivary lavo"* ("playing at fallen rice").

The single defect apart, the Malagasy see many virtues in rice which they take as a model on which to base their own conduct.

Rice itself is often personified. When the stems swell, just before the heads form, the rice is said to be "pregnant"; and when the head breaks out, the rice is said to be "giving birth". For the Malagasy, the growth pattern of rice recalls that of man—when the heads first form, they stand erect with the proud vigour of youth; they end by bending under the weight of age and the "fullness of years".

The symbiosis between rice and water has always been taken as the symbol of undying friendship or love: "May this friendship (or love) be like that of rice and water; in the fields they are always together and in the house they are inseparable". Of marriage it is said: "Love is like a young rice plant; if it is not transplanted, it will never blossom".

Many other popular sayings describe human behaviour by reference to rice. Thus to encourage each other to speak out at a meeting, for example, people say: "Let us be like rice, let everyone reveal what he has in his heart".

During the long evenings around the fire, rice is an inexhaustible source of discussion, jokes and riddles such as this: "Of whom is it true that you must take his life in order to make him live the better?" Yes, you have guessed it; the answer is the rice plant that must be plucked from the seed bed to be transplanted to the paddy field. ■

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A versatile plant

Rice is one of the most adaptable members of the plant kingdom. From its original habitat in the hot, humid Tropics, rice has spread throughout the world by natural dispersal and human intervention. It is now cultivated in hot deserts and in the cool climate of high mountains. In parts of Asia, Africa and Latin America it is cultivated as a dry-land crop, while in parts of Bangladesh, Burma, eastern India, Thailand and Viet Nam floating rices flourish in floodwaters that can be as much as three metres deep. The two main cultivated species are Oryza sativa, of Asia, and Oryza glaberrima, of west Africa. Archaeological data seem to show that Oryza sativa was first domesticated in Asia more than 7,000 years ago, and that domestication of Oryza glaberrima in Africa occurred somewhat later. It seems probable that rice was cultivated in the Niger basin around 1500 BC and in Guinea about 400 years later; it is now one of the principal crops cultivated in the flood-plain areas of the Sokoto and Niger basins. From top to bottom, transplantation of rice in Senegal, in France and in Colombia.

Photo Dominique Roger, Unesco

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UNICEF Greeting Cards

Artists and museums from many countries have again contributed an attractive and varied range of designs to this year's UNICEF greeting cards, now on sale at UNICEF sales points throughout the world.

Proceeds from the sales of cards, gifts and stationery help UNICEF, the United Nations Children's Fund, to finance its programmes for bringing improved health care, education, nutrition and sanitation to millions of deprived children throughout the developing countries of Africa, Asia and Latin America.

The sale of one card alone provides the funds to vaccinate 4 children against diphtheria, whooping cough and tetanus, or to protect 10 children against blindness. In addition to standard-size and mini-format cards and stationery, an Art diary for 1985, International Youth Year, features photos of children and young people from 57 countries. Card shown here reproduces "Water Birds", a design contributed by Indonesian artist Iwan Tirta.

Unesco Peace Education Prize awarded to international physicians' group

The 1984 Unesco Prize for Peace Education has been awarded to the International Physicians for the Prevention of Nuclear War. The US-based group is headed jointly by a Soviet and a US cardiologist, Evgueni Chazov of the Soviet Union and Bernard Lown of the United States, who accepted the $60,000 award at a ceremony at Unesco's Paris Headquarters on 30 October. The object of the annual Prize, awarded for the first time in 1981, is to promote action aimed at constructing the defences of peace in the minds of men, as laid down in Unesco's Constitution. The Prize is financed by a gift of $1 million from the Japanese ship-building industry.

Unesco Medal for Istanbul and Goreme

Unesco has issued a medal to enable people to contribute to efforts to save historic sites and monuments in Turkey. The obverse side of the medal features the great mosque of Suleymaniye in Istanbul, where Unesco is concerned in the preservation of ancient buildings and quarters, and the reverse (below) shows a Virgin and Child above the rugged landscape of the Goreme valley in Cappadocia where Unesco is engaged on a campaign to save the structures of churches hewn out of the living rock. Designed by the Turkish artist Handan Borutecene, the medal was struck at the Paris mint and is available in gold, silver and bronze. For further information about this or other medals issued by Unesco, please write to: Philatelic and Numismatic Programme, Unesco, 7 Place de Fontenoy, 75700 Paris.

Sinhala edition of the Unesco Courier

We are pleased to announce the launching of a quarterly Sinhala edition of the *Unesco Courier*, published by the Sri Lanka National Commission for Unesco, Ministry of Justice, Hulftsdorp, Colombo 12. The publication of the first issue of the Sinhala edition in August 1984 brought the total number of different language editions of the *Unesco Courier* up to 28, in addition to the quarterly Braille selection.

New price of the Unesco Courier

The continued rise in production and distribution costs unfortunately obliges us to increase the price of the Unesco Courier. For 1985, our new rates will be:

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- Two-year subscription (valid only in France): 120 French francs
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BRODARD GRAPHIQUE. CDULOMMIERS - Dépôt légal C 1 - Décembre 1984 - IMPRIMÉ EN FRANCE (Printed in France)
PHOTOCOMPOSITION-PHOTOGRAVURE CHRISTIAN PAGNOUD - 6/8 rue des Epinettes - 75017 PARIS.

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Seeds of hope

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